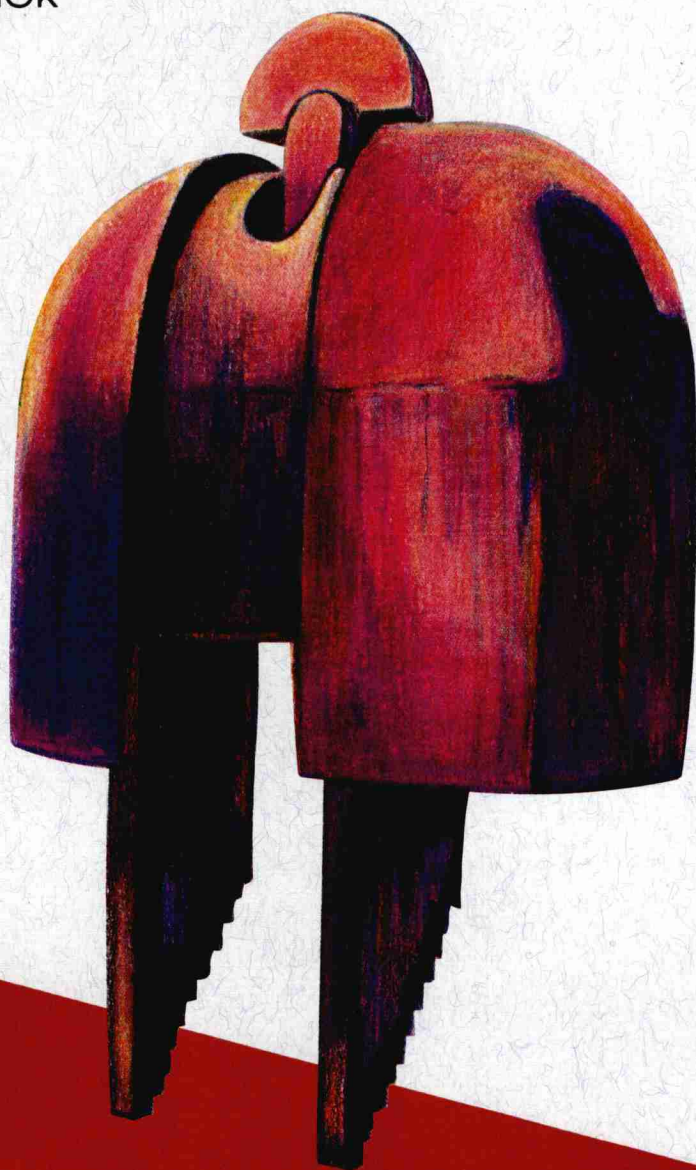


An Industrial Strategy for

# the Motor Vehicle Assembly and Component Sector

Anthony Black



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Project

***AN INDUSTRIAL STRATEGY  
FOR THE MOTOR VEHICLE ASSEMBLY  
AND COMPONENT SECTORS***

***Anthony Black***

Industrial Strategy Project  
Development Policy Research Unit  
School of Economics  
University of Cape Town

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## EDITORIAL COMMENT

This report is one of a series produced by the Industrial Strategy Project.

The ISP has its origins in the Economic Trends Research Group, a collective of economists and other social scientists convened by the Congress of South African Trade Unions in 1986. COSATU, under attack for its support for sanctions, initially asked these researchers to examine the impact of enforced isolation on the South African economy. It soon became clear that sanctions were a small aspect of the problems besetting the South African economy, and the work of the Economic Trends Research Group expanded into a full-blown analysis of South Africa's economic crisis.

The poor performance of South Africa's manufacturing sector loomed large in the litany of problems bedeviling the South African economy. The 1980s had been, in economic terms, something of a lost decade. The manufacturing sector was particularly conspicuous by its inability to create jobs, and to produce commodities that satisfied the divergent requirements of the domestic and international markets. A range of factors contributed to this malaise – apartheid's impact on the skills profile of the workforce, repressive and outmoded industrial relations systems and work organisation, a highly concentrated industrial structure and a concomitantly weak and repressed SME and micro-enterprise sector, and a highly inward oriented trade regime, were the most obvious sources of the crisis in manufacturing.

However, the solutions were less obvious than the problems, and in 1990, again at COSATU's initiation, the ISP was conceived. From the outset, the political environment ensured that the ISP would not be an ordinary research project. The unbanning of the ANC and the certainty of the immediate accession to power of COSATU's political ally, coupled with the union federation's increasingly direct role in policy formulation, ensured that the ISP focus closely on policy, contributing to the development of the industrial policy that would address the poor performance of South African manufacturing.

To this end, the ISP engaged a range of researchers with the purpose of undertaking detailed examinations of the key sub-sectors of South African manufacturing. The fruits of the ISP are to be found in the reports, such as this one, most of which are to be published by the UCT Press. The authors of the reports were assigned, generally for a period of 14 months, to the study of a particular sector. The researchers were required to study the local sector and the factors promoting and restraining its development. They were required to assess its prospects in the light of the likely global trajectory of the industry. Detailed examination of local firms were complemented by international visits that enabled the researchers to consult with international experts and visit factories to enable them to situate South African firms in a comparative perspective.

In addition to the sectoral studies, the ISP also engaged researchers to examine key cross-cutting issues. Those selected for study were human resource development and industrial relations, technology development, market and ownership structures, trade performance and policies, and regional industrial strategies.

Industrial policy is not a plan easily contained between the covers of a single document. It is a process, a process of engagement between the key industrial stakeholders. South Africa's peculiar transition has given concrete expression to this credo, with the tripartite National Economic Forum and the various sectoral task groups the key institutions and processes within which an evolving industrial policy is being developed. COSATU has played the leading role in this process. The ISP has, in turn, made a significant contribution to COSATU's capacities. It has done this by constant dialogue between the ISP and the COSATU leadership, and by a traineeship programme which saw a number of union leaders seconded to the ISP for its duration.

In addition the research process has engaged a range of key actors. Individual researchers have engaged with union and business leaders and experts within government. The ISP was punctuated by a series of intensive workshop attended by the researchers, COSATU and ANC leaders, and other local and international experts. The work-in-progress was thoroughly discussed and critiqued at these workshops and it is appropriate to see each report as owing a great deal to the ISP collective.

A number of researchers are continuing their work from within the industry task forces, the unions, and the structures of the new government. The ISP itself is moving into a second phase, taking up questions still unanswered, re-examining conclusions of the first phase and continuing the unending process of developing industrial policy. It is in this spirit that these reports should be read: they are not final plans, but simply attempts to start a vital process, one that will of necessity be taken forward by all of the major industry participants.

The Industrial Strategy Project was funded by generous grants from the Humanistisch Instituut Voor Ontwikkelingssamenwerking (HIVOS) of The Netherlands, the International Development Research Centre (IDRC), Ottawa, Canada, and the Olof Palme International Centre of Sweden. We benefitted not only from the financial resources of these institutions, but also from the wide-ranging experience of their staff members and their deep and abiding commitment to a democratic and prosperous South Africa.

Avril Joffe  
David Kaplan  
David Lewis  
Raphael Kaplinsky

ISP Co-Directors  
Development Policy Research Unit  
University of Cape Town

## FOREWORD

In the late eighties COSATU commissioned a group of economists to prepare a report analysing the impact of sanctions on the South African economy. We commissioned this work in response to criticism in the media and elsewhere that held us – through our support for sanctions – responsible for the sorry state of the South African economy, including the miserable conditions of our members and others whose interests and aspirations we represented.

The research revealed that the crisis of the South African economy was rooted in the policies of the apartheid era and our commission to the economists was transformed into a full-scale critique of the economics of apartheid. A key consequence of the failures of apartheid's social and economic policies was its unproductive manufacturing sector. It was unable to produce basic goods of a suitable quality and at an affordable price; it was unable to produce goods that successfully penetrated international markets; it relied on low paid, poorly trained workers, and harsh, authoritarian shop floor supervision; above all, it proved incapable of generating desperately needed employment. While manufacturing's contribution to the global economy escalated, South Africa relied increasingly on its natural resource base and the cheap labour that mined and farmed it.

Appreciation of these problems inspired COSATU to request its research collective to undertake research in support of our attempt to formulate a new industrial policy. This request flowered into the Industrial Strategy Project whose output is represented in these reports.

The research process has been characterised by considerable dialogue between COSATU, its affiliates and the researchers. We have learnt much from this interaction; we are confident that we have taught the researchers much. However this work is the output of an independent research collective. As is to be expected in an arms length relationship of this kind, we do not agree with every line of each report, we do not accept every recommendation. But with regard to its major findings, we do agree that there is a real potential for building an efficient manufacturing base, rooted in well paid, productive workers. Above all we believe, and this is endorsed by the ISP, that an independent trade union movement actively and aggressively pursuing its interests is not merely compatible with rapid and sustainable industrial development – it is a precondition.



John Gomomo  
President, Congress of South African Trade Unions

## **Acknowledgements**

Many people have given freely of their time and assisted in the course of this project. I am grateful to all those from automotive companies, industry federations, unions, consulting firms, research institutions and other organisations who granted interviews or assisted with information. I have also had useful discussions with members and participants in the Motor Industry Task Group especially on policy questions. I benefitted enormously also from inputs by colleagues on the Industrial Strategy Project and from other participants at our Workshops who made many useful comments both on interim papers and on the final draft. Sean Archer, Bill Freund, Richard Lamming, Dave Kaplan and Raphie Kaplinsky provided extensive comment at various stages. In particular, I would like to thank David Frost, Thalassa Matthews and Rachmat Harris for assisting in the final stages of the production of this report.

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## **Abbreviations**

<b>BTI</b>	<b>:</b>	<b>BOARD OF TRADE AND INDUSTRY (LATER BECAME BTT)</b>
<b>BTT</b>	<b>:</b>	<b>BOARD ON TARIFFS AND TRADE (FORMERLY BTI)</b>
<b>CBU</b>	<b>:</b>	<b>COMPLETELY BUILT-UP</b>
<b>CKD</b>	<b>:</b>	<b>COMPLETELY KNOCKED-DOWN</b>
<b>COSATU</b>	<b>:</b>	<b>CONGRESS OF SOUTH AFRICAN TRADE UNIONS</b>
<b>CPI</b>	<b>:</b>	<b>CONSUMER PRICE INDEX</b>
<b>DTI</b>	<b>:</b>	<b>DEPARTMENT OF TRADE AND INDUSTRY</b>
<b>GATT</b>	<b>:</b>	<b>GENERAL AGREEMENT ON TARIFFS AND TRADE</b>
<b>GEIS</b>	<b>:</b>	<b>GENERAL EXPORT INCENTIVE SCHEME</b>
<b>IDC</b>	<b>:</b>	<b>INDUSTRIAL DEVELOPMENT CORPORATION</b>
<b>JIT</b>	<b>:</b>	<b>JUST-IN-TIME</b>
<b>MBSA</b>	<b>:</b>	<b>MERCEDES-BENZ OF SOUTH AFRICA</b>
<b>NAACAM</b>	<b>:</b>	<b>NATIONAL ASSOCIATION OF AUTOMOTIVE COMPONENT AND ALLIED MANUFACTURERS</b>
<b>NAAMSA</b>	<b>:</b>	<b>NATIONAL ASSOCIATION OF AUTOMOTIVE MANUFACTURERS OF SOUTH AFRICA</b>
<b>NAFTA</b>	<b>:</b>	<b>NORTH AMERICAN FREE TRADE AREA</b>
<b>NIC</b>	<b>:</b>	<b>NEWLY INDUSTRIALISED COUNTRY</b>
<b>NUMMI</b>	<b>:</b>	<b>NEW UNITED MOTOR MANUFACTURING INC.</b>
<b>NUMSA</b>	<b>:</b>	<b>NATIONAL UNION OF METALWORKERS OF SOUTH AFRICA</b>
<b>OE</b>	<b>:</b>	<b>ORIGINAL EQUIPMENT</b>
<b>OEM</b>	<b>:</b>	<b>ORIGINAL EQUIPMENT MANUFACTURER</b>
<b>SKD</b>	<b>:</b>	<b>SEMI KNOCKED DOWN</b>
<b>VWSA</b>	<b>:</b>	<b>VOLKSWAGEN OF SOUTH AFRICA</b>

# **Executive summary**

---

This report constitutes a policy oriented analysis of the South African motor vehicle and component manufacturing sector. The central concern is the question of whether a large, dynamic and internationally competitive industry is viable in South Africa and the policy requirements to achieve this. This is the question posed in the first introductory section where it is argued also that the research undertaken demonstrates that with an appropriate policy framework the South African industry is potentially well placed to become a significant producer of vehicles and components.

## **Chapter one: Global trends – implications for developing countries**

### **Markets**

In spite of the current global recession the longer term trend has been a rapid increase in production accompanied by increased internationalisation of investment and the emergence of new production locations.

These processes are creating new opportunities for certain developing country industries but are also sidelining others from access to new technology and investment.

Successful exporting is essential in order to generate foreign exchange, smooth production levels and achieve economies of scale. Long distances from markets, although a disadvantage, are by no means an overriding constraint. The growing application of just-in-time supply and resulting pressures to locate close to assembly plants are significant for some types of components but not for others.

Competition on world markets is severe and there is currently considerable overcapacity particularly in assembly. In order to compete, component suppliers have to be able to offer ongoing price reductions.

Outsourcing by the principal producers is increasing and most assemblers and first tier component producers are looking to lower wage countries for at least some components. There exists, therefore, a large variety of niche markets which are accessible to a wide range of developing country capabilities.

## **Supply side factors**

The cases of Korea, Mexico and Taiwan illustrate that developing countries can compete effectively in highly competitive advanced country markets for fully built up vehicles and major components both in terms of quality and productivity.

New forms of production organisation can be successfully implemented in developing countries as long as due regard is given to the specific social context and training requirements.

Assembly only accounts for 15–20% of the total value of motor vehicle production and competitively priced and high quality component supply is critical for a competitive assembly operation.

Although labour costs are falling as a proportion of direct costs they remain highly significant. High labour costs are leading to a relative increase in outsourcing and production relocation from the three major producing countries – Germany, Japan and the USA.

There is little evidence pointing to a significant decline in minimum efficient plant scale although a single plant can now produce a wider variety of products.

## **Strategic issues**

The global industry is becoming more integrated and the locational decisions of the multinational producers are critical for aspiring developing country industries.

Many developed and developing countries are trying to encourage vehicle exports to earn foreign exchange and to improve capacity utilisation. This means that competition is severe both to attract new investment and in the international market itself. For the most part, the major producers have established their strategic locations mainly in countries with large populations and are unlikely to expand these significantly.

It is therefore essential for aspiring developing country producers to secure for themselves some favourable linkage into these global networks. This requires a stable and effective policy regime and bargaining by host country industries and governments.

## **Chapter Two: The development of the South African industry**

The South African industry has performed extremely poorly in terms of output levels since the early 1980s but problems such as a lack of international competitiveness go back much further.

Past policies of protection and local content requirements have been the key factors which have led to the proliferation of low volume assemblers supplied by low volume, high variety component producers.

The current local content programme (Phase VI) introduced in 1989 sought to address the problems of a low volume, high cost production structure by encouraging specialisation through allowing exports to be counted as local content.

Phase VI has had a number of effects:

- it encouraged a rapid growth in exports of both components and built up vehicles.
- it led to a rapid shift in component sourcing arrangements putting many traditional component suppliers under extreme pressure from imports.
- it led to a further increase in proliferation due to the fact that protection of components was reduced while rates of protection on built up vehicles were maintained thus raising the effective rate of protection.

### **Chapter Three: Competitiveness in the South African automotive industry**

While the industry is currently generally uncompetitive there are important areas of competitive strength.

The industry is extremely reliant on foreign technology which is expensive and more importantly has led to restrictions on exports (through restrictive licence agreements). However there is a basic level of technological competence and a clear capacity to introduce productivity enhancing technological adaptations.

The assembly industry is uncompetitive due to:

- the high cost of locally produced components which have historically received substantial protection via the local content programme.
- a lack of economies of scale due to the inordinate number of models which are produced in the local market. Average annual production per model is much lower even than in low volume producers such as Brazil and Australia.
- low capacity utilisation.
- the fact that the industry trails world best practice by a substantial margin in terms of productivity and lean manufacturing benchmarks such as quality and inventory levels. Very limited progress has been made in mobilising the workforce in pursuit of productivity objectives and training of new production workers is very limited by world standards.

The component industry is uncompetitive as a result of:

- the impact of previous local content programme and the low volume, high variety requirements of the domestic market.
- a lack of economies of scale. Minimum efficient scale is greater in components production than in assembly and South African firms generally produce an unusually wide range of components at exceptionally low volumes by world standards.
- high costs for raw materials such as steel and aluminium.

However, the industry has developed certain areas of competitive strength. Because of its focus on high variety and low volume components, producers have developed considerable expertise in this area and can compete in niche markets such as the international aftermarket or low volume original equipment. Another area of emerging competitiveness is in components which have a high raw material content and where licencing does not present a constraint (eg. aluminium wheels).

## **Chapter Four: Case studies of firm level restructuring**

Under Phase VI of the local content programme, the industry is becoming increasingly integrated into global trade. This has posed challenges and opportunities for assemblers and component producers.

The supply response by firms to greater international integration is what will determine the success of a restructuring programme. Firms have responded in various ways and productivity has improved but at great cost in terms of employment.

Gabriel SA, a foreign owned shock absorber producer has achieved large productivity gains through reorganising production on the basis of JIT manufacturing cells. While this demonstrates the potential effectiveness of Japanese style production methods, there have been severe employment losses. This is a major reason why workers have historically regarded productivity initiatives with suspicion.

However the Gabriel experience illustrates that improving flexibility offers considerable scope for productivity improvement in South Africa's high variety, low volume industry.

Atlantis Diesel Engines is indicative of the problems faced by major component producers resulting from the small size of the South African market and dependence on foreign technology.

The standardisation of diesel engine manufacture has led to considerable advantages but also illustrates that standardisation is only a partial solution to the problems of proliferation because the South African market is so small that in certain product lines it cannot even support one world scale producer.

The case of BMW illustrates that South Africa may have greater potential as a car producer than is generally realised.

The company is considering expanding production in South Africa and exporting vehicles on a significant scale on the grounds that:

- labour costs are considerably lower than in Germany
- they have an existing production facility in South Africa
- South Africa has an advantage in raw materials and also certain components.

## **Chapter Five: Which way forward for the South African motor industry?**

Past policy has seriously impeded the development of a viable motor industry in South Africa mainly because it encouraged the unrestrained proliferation of makes and models being assembled in South Africa thus creating problems also in the component sector. Phase VI has increased competitive pressure on components producers but not on assemblers.

The underlying conditions exist in South Africa for very significant expansion in the industry. These include:

- the large potential for market growth both in South Africa and Southern Africa.
- the advantage of being an intermediate economy. The percentage share of world production in middle income countries is rising.
- natural and human resources and infrastructure are all at a reasonable level of development. The emergence of tripartite policy making offers considerable potential benefits in terms of more stable industrial relations as well as drawing labour into the process of setting a new direction for the industry.

There is scope for improving competitiveness both in areas such as niche market production where the industry is already strong but also in areas where the industry is weaker such as in the production of major components.

There are three possible growth paths open to the industry:

- rapid liberalisation
- further import substitution
- guided integration into the world market

Rapid liberalisation has little to recommend it and policy needs to aim at maximising the benefits and minimising the costs of a guided integration strategy with elements of selective import substitution.



The trade regime is an important policy instrument but it needs to be complemented by supply side policies in areas such as training and R&D.

Trade policy should aim at encouraging structural changes and export growth before exposing the local industry to excessive foreign competition.

Establishing an efficient structure for the industry is also an important policy objective and should precede any further significant liberalisation of trade barriers. The problem of proliferation can be dealt with by a combination of the following strategies.

- a reduction of models and makes being produced in South Africa.
- standardisation in selected areas.
- specialisation and the expansion of exports.
- greater flexibility.

The above policy measures need to be complemented by supply side policies which:

- encourage greater investment in R&D.
- significantly expand and reorientate training.
- accelerate the adoption of new forms of work organisation.
- encourage new investment.
- build the institutional structure which supports the industry.

# Introduction

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The objective of this report is to provide a policy oriented analysis of the South African motor vehicle assembly and component industry.<sup>1</sup> The industry has long been a problem sector in South African manufacturing and current development policy is now under review following the appointment in late 1992 of the Motor Industry Task Group whose brief is to make recommendations about policies to promote the future development of the industry.

It is no exaggeration to say that the industry is at the crossroads. What is at stake is no less than the type of motor industry with which South Africa will enter the 21st century. What happens in this industry, furthermore, will have important ramifications for other manufacturing sectors and for the economy as a whole. While the performance of the broader economy will have an important bearing on how the sector develops, the course of events will also be crucially shaped by actors within the industry – the companies themselves, the trade unions and governmental agencies.

Appropriate policy and a wide mobilisation of support for this policy is essential if the industry is to survive and grow. For its part, government needs to exercise leadership by establishing, in cooperation with other players, a clear and consistent set of policies and by putting in place a set of 'enabling mechanisms' such as appropriate support for the upgrading of the skill and technological infrastructure of the industry. It will be necessary that firms respond positively, for example, by making appropriate investments, in support of this long term vision. The unions also have an important role in driving the process. They realise perhaps more clearly than anyone else the stark consequences of further decline and the need for a proactive strategy. NUMSA, by far the most important union in the industry, is already involved in major initiatives in this regard.

At first glance, it may appear that the South African motor industry has very limited prospects. Highly protected and inefficient according to most international standards, far from major markets and mired in long term decline, it clearly lacks competitive advantage. However, at the outset of a policy oriented study, it may be more appropriate to ask why a country with a long history of automotive production, an accumulation of skills at all levels, an abundance of the necessary raw materials, a market which is not insignificant and which has huge potential, a highly developed technological capacity in certain areas and excellent infrastructure has not been able to develop a larger and more competitive industry?

---

1. The focus is on production and little attention is devoted to the service sector side of the industry such as the distribution system. Assembly of heavy vehicles is excluded although component production for heavy vehicles is covered to some extent.

It is the contention of this report that South Africa, in terms of its level of development, its existing capabilities and resources and the potential in the longer term of its domestic and regional markets is potentially well placed to emerge as a significant vehicle producer by the year 2005.

In the opening chapter, we examine global trends in production and trade and their implications for developing country automotive industries. The report also assesses the diffusion of best practice techniques in manufacturing. Japanese production techniques are proving highly transferable not only to developed countries but also, in certain instances, to middle income countries. One result of these trends is that the global share of developing countries in world automotive production is rising significantly while that of existing major producers is likely to fall. The reasons for this are simple. Making cars and components (as opposed to designing them) is essentially not very complicated – it is an industrial activity in which middle income countries (which have a lower cost structure) can attain productivity levels which approach those of the advanced countries.

The chapters on the South African industry deal, firstly, with why the industry is so fragmented and uncompetitive. This can be traced directly back to the policy of indiscriminate protection that has been applied over the last few decades. The Phase VI local content programme was an important turning point but has introduced further difficulties.

Chapter Three examines the weaknesses and strengths of the South African industry. Weaknesses include high raw material and component costs and outdated work organisation. Nevertheless, some firms have reacted dynamically to growing domestic and international competitive pressure by introducing far reaching shifts in strategy and reorganising production.

Although the industry is uncompetitive in many areas, it has developed very important capabilities, for example, in low volume, high variety production. Most importantly, it is also clear that the opportunities for productivity growth are enormous. Improvements in any one of the following areas could generate significant productivity gains, together they would transform the industry:

- Rationalisation of the industry to generate higher volume production and improve capacity utilisation. While the flexibility and small scale capabilities of the industry are an important strength, there are many areas where higher volumes would greatly reduce unit costs.
- New investment into the industry can play a major role in improving productivity by modernising equipment, introducing greater levels of automation and by adding to capacity with the focus on export markets.
- Significant productivity gains can also be made in terms of the organisation of production and the upgrading of skills of all sectors of the workforce.

---

There are many international examples of automotive industries with seemingly good prospects which have gone into serious decline. There are other cases where industries facing major problems have been turned around. Many things will have to happen if a new virtuous circle of investment and expansion in the South African automotive industry is to be established. The challenge to policy is to bring about these conditions.

# **Chapter One: Global trends – Implications for developing countries**

---

## **1. Introduction**

The production of motor vehicles is one of the world's largest industries. It is also an industry in which major international shifts in the location of production are occurring as transnational corporations seek to globalise their production and markets. The industry is at the cutting edge of new technology and product development and especially of new forms of production organisation. It is within this fast changing system that many developing countries with relatively small markets and weak technological capabilities have sought to create for themselves a role as producers of vehicles and components. In many instances, the automotive industry has been considered to be especially deserving of various forms of state support and has played an important role in the successful national development of some countries while in others it has imposed a severe burden on economic development.

Many factors will impact on the future of the automotive industry in developing countries. The critical factor will be the development of their own industrial and technological capabilities. But the expansion of the industry will also be subject to strong pressures exerted by global trends and structural shifts in competitiveness, technology, investment and trade. This chapter traces the key international developments in the automotive and components industries focusing on the implications for developing country production in general and for the South African industry in particular. The central question being addressed, therefore, is whether international developments pose opportunities or constraints for automotive industries in developing countries such as South Africa.

There is a view which emerged in the mid-eighties (Jones and Womack, 1985; Altshuler et al, 1984; Hoffman and Kaplinsky, 1988) that argued that new developments in production organisation and technology such as flexible automation were likely to impact negatively on the prospects of developing countries as competitive suppliers to major world markets. Jones and Womack (1985) argued, for example, that the conventional view that lower wages would mean that the world automobile industry (starting with labour intensive components) would start to go the way of the textile industry and increasingly relocate in developing countries, was flawed. This was because the revolution in production organisation pioneered in Japan more than compensated for any low wage advantage that developing countries may have. Also, greater levels of automation were reducing the amount of direct labour in assembly and component manufacture thus undermining the advantage of lower wage countries. Secondly, it was argued that innovations such as just-in-time (JIT) were leading assemblers to source their components from nearby locations reducing opportunities for far flung sources of component supply. The implications for

aspirant developing country producers were highly significant. It meant the demise of the 'world car' and limited opportunities for component export except for the more labour intensive, basic items. These authors highlighted the existence of important new trends and quite correctly pointed out the pitfalls of competitive strategies based on relocation to low wage countries. However, it is argued in this chapter that some of the pessimistic conclusions (from the point of view of developing country producers) have not been fully borne out by the actual development of world investment, production and trade during the last decade.<sup>1</sup>

It is true that direct labour costs are falling as a proportion of total production costs. However, certain developing countries have been able to attain high productivity levels through the adoption of best practice techniques which means that they can retain their labour cost advantage. Secondly, the picture with regard to component supply is more complicated than suggested by the view that new forms of production organization require component suppliers to locate close to assemblers. International trade in components is growing rapidly and much of this is over long distances. Middle income developing countries account for a growing slice of this expansion.

We argue that the opportunities emerging in domestic and international markets together with the location of international investment and new developments in production organization and technology create substantial opportunities for developing countries which are able to implement appropriate policies.

## **2. Markets and production**

### **2.1 Global demand**

The extremely severe recession that has afflicted the world's major vehicle markets over the past two years has tended to overshadow the rapid increase in demand for vehicles that has occurred during the past decade. As Table 1.1 indicates, vehicle ownership is highly concentrated in North America, Europe and Japan. Growth has, however, been uneven across regions with Asia registering the most rapid expansion with exceptionally high rates of growth in Korea, China, Taiwan and Thailand. Interestingly, from the point of view of the South African industry, Africa has been the second fastest growing region although this is off an extremely low base. Most of this expansion took place in South Africa and north Africa but there has been a reasonable increase in vehicle ownership even in the countries of sub-Saharan Africa in spite of extreme economic difficulties experienced during the 1980s.

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1. The positions of some of these analysts have been somewhat modified in their more recent publication (Womack et al, 1990)

A return to growth could lead to very rapid expansion in this market albeit off a low base, with important implications for the South African industry. Latin American vehicle ownership has grown at well below the world average as a result of the economic difficulties of that region.

Developing countries clearly represent a huge potential market and although the vast majority of new cars will be sold in OECD countries during the next decade the rate of expansion will be much higher in developing countries. According to the Economist Intelligence Unit, the share of developing country passenger car sales will rise from 9.6% in 1990 to 14.6% by the year 2000 (O'Brien, 1990). A number of significant new markets are likely to emerge from within the ranks of the developing countries and rapidly rising incomes in Asia and elsewhere could mean that the above projection is an underestimate. South Korea with car sales in 1992 of 850 000 is already in the top ten of the world's car markets.<sup>2</sup> As average national incomes in middle income countries rise, the proportion of those with incomes allowing them to purchase vehicles rises far more quickly. For example, average per capita income in Malaysia rose from \$1 900 in 1987 to \$2 700 in 1991, an increase of 40%, but the proportion of people with incomes above \$4000 (the threshold for buying cars) increased much more rapidly. Thus car sales in Malaysia increased by 290% over this period (*Economist*, 23 January, 1993). Other fast growing Asian countries will also become significant markets. China with its burgeoning growth and exceptionally low current rates of vehicle ownership will be one of the fastest growing markets but from a very low base.

As Figure 1.1 indicates, car ownership is closely correlated with per capita income levels but there are significant variations resulting from taxation levels, controls on imports, the availability of credit and the level of development of infrastructure. Income distribution also plays a role. In middle income countries, increased income inequality produces a greater demand for cars while conversely a more progressive distribution of income would tend to limit the demand for cars (Jenkins, 1987:106).

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2. 'World car Industry', *Financial Times Survey*, 20 October, 1992.

**Table 1.1**  
**Vehicles in use by region (thousands)**

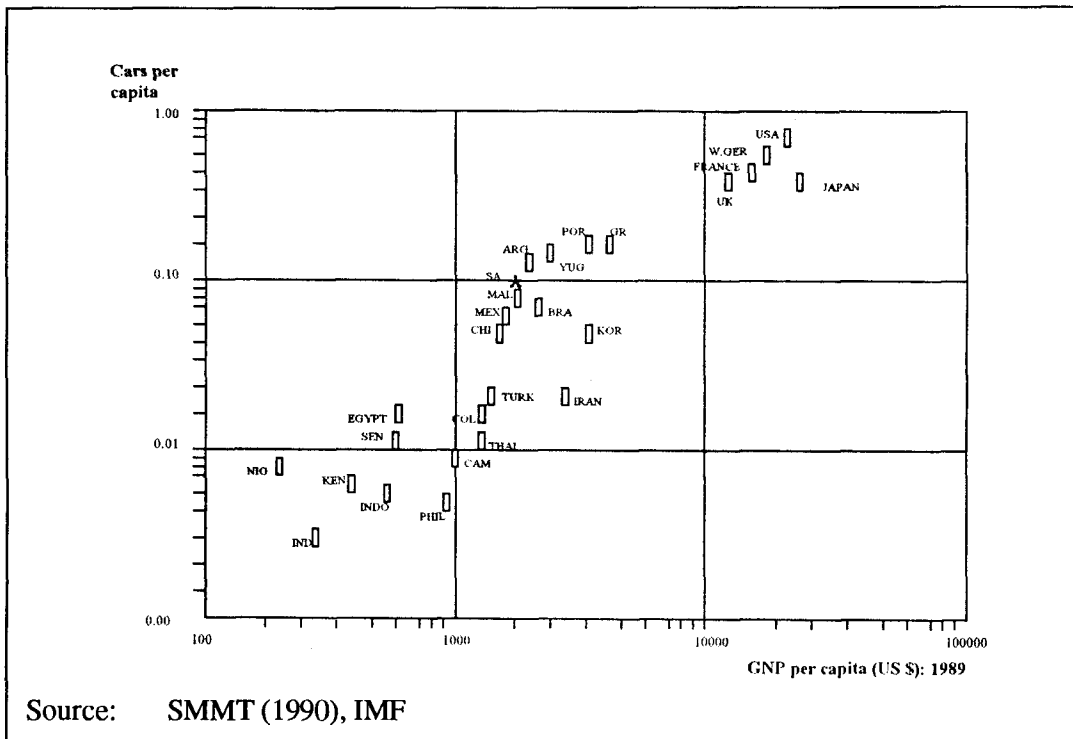
REGION	1982	1990	%CHANGE	1990 % PASSENGER CARS	1990: PERSONS PER VEHICLE
Argentina	4550	5680	24.8	73.7	5.6
Brazil	10401	12650	21.6	81.0	11.4
Canada	13850	16774	21.1	78.8	1.5
Mexico	6390	7825	22.5	69.3	10.6
USA	160443	192000	19.7	76.6	1.2
<b>Total America</b>	<b>204018</b>	<b>244834</b>	<b>20.0</b>	<b>76.3</b>	<b>2.8</b>
Angola	100	167	67.0	74.9	60.0
Egypt	555	1548	178.9	75.5	33.5
Kenya	252	300	19.0	50.0	80.0
Nigeria	1150	1410	22.6	55.7	75.0
South Africa	3600	4798	33.3	70.4	7.0
Zambia	136	165	21.3	60.6	45.0
Zimbabwe	220	285	29.5	73.7	32.0
<b>Total Africa</b>	<b>10122</b>	<b>14106</b>	<b>39.4</b>	<b>65.5</b>	<b>43.2</b>
China	970	4776	392.4	25.9	245.0
India	1649	3972	140.9	62.5	200.0
Indonesia	1880	2772	47.4	46.7	63.1
Japan	41346	57698	39.5	60.5	2.1
Korea, Rep of	610	3395	456.6	61.1	12.4
Malaysia	985	1585	60.9	77.3	10.7
Taiwan	790	2115	167.7	74.9	9.4
Thailand	925	2250	143.2	36.7	25.0
<b>Total Asia</b>	<b>58535</b>	<b>92595</b>	<b>58.2</b>	<b>58.9</b>	<b>31.1</b>
France	23190	28460	22.7	82.7	2.0
Germany West	25684	32698	27.3	93.9	1.9
Italy	21015	29929	42.4	91.9	1.9
Spain	9859	14374	45.8	83.5	2.7
United Kingdom	17924	26412	47.4	87.5	2.2
<b>Total EEC*</b>	<b>111835</b>	<b>149686</b>	<b>33.8</b>	<b>88.1</b>	<b>2.2</b>
Germany East	3222	4349	35.0	89.7	3.8
Poland	4102	6304	53.7	83.4	6.0
Soviet Union	17500	25500	45.7	62.7	11.0
<b>Total Europe</b>	<b>157930</b>	<b>215540</b>	<b>36.5</b>	<b>84.4</b>	<b>3.8</b>
Australia	7955	9777	22.9	78.5	1.7
<b>Total Oceania</b>	<b>9868</b>	<b>12030</b>	<b>21.9</b>	<b>78.6</b>	<b>2.1</b>
<b>Grand Total</b>	<b>440473</b>	<b>579104</b>	<b>31.5</b>	<b>76.3</b>	<b>8.7</b>

\* Portugal and Spain included in EEC figure for 1982

Source: Society of Motor Manufacturers and Traders Ltd, 1983,1990.



**Figure 1.1**  
Cars owned in relation to GNP per capita



## 2.2 Global supply

International developments in the global auto industry have been overshadowed by severe recession which has produced massive worldwide overcapacity and is leading to extensive restructuring particularly by American and European producers. Nevertheless, a number of underlying trends are evident with important implications for developing country industries.

The first major trend is the increased globalization and international integration of the industry as the major producers develop multiple bases and become involved in corporate tie-ups and joint ventures with foreign firms. Secondly, important shifts are taking place in the location of new investment as firms seek footholds in new markets, establish capacity behind protectionist barriers or seek lower cost production sites. The third important change concerns the production process. The system of 'lean production' pioneered by Toyota and other Japanese companies has given them an important competitive advantage. American and European firms are now responding to this challenge and have been rapidly moving to implement Japanese style methods.

World vehicle production has increased from 28 million units in 1970 to 48.6 million in 1990 of which car production accounts for 36.2 million units (VDA, 1991). The most striking feature has been the growing share of Japan which in 1991 was the world's largest producer accounting for 28.1% of global output. This expansion has been accompanied by an equally dramatic decline in the world market share of the United States (Figure 1.2).

Global production of cars fell by 4.1% in 1991 to 34.7 million units and fell further in 1992. The major producing countries are indicated in Table 1.2.

The US market has become increasingly penetrated by Japanese imports leading to a massive trade imbalance in autos.<sup>3</sup> Resulting trade friction led to voluntary export restraints being imposed against Japan. This has led Japanese firms to establish plants within the US which by 1992 had already taken a share of close to 20% of the American car and light truck market (*Economist*, 28, November, 1992), up from 6% in 1986. These plants have for the most part been extremely successful, matching Japanese levels of productivity and quality. This coupled with the strengthening of the yen against the dollar since the mid eighties means that Japanese firms can now build cars more cheaply in America than in Japan.<sup>4</sup>

**Table 1.2**  
**World car production: major producing countries, 1991**

	World Share %
Japan	27.0
US	17.1
Germany	14.0
France	9.6
Spain	5.2
Italy	4.3
UK	3.6
S.Korea	3.7
Other	15.5
(South Africa)	0.6
<b>World production</b>	<b>34.7 million cars</b>

Source: Adapted from *Financial Times Survey*, World Car Industry, 9 September, 1993.

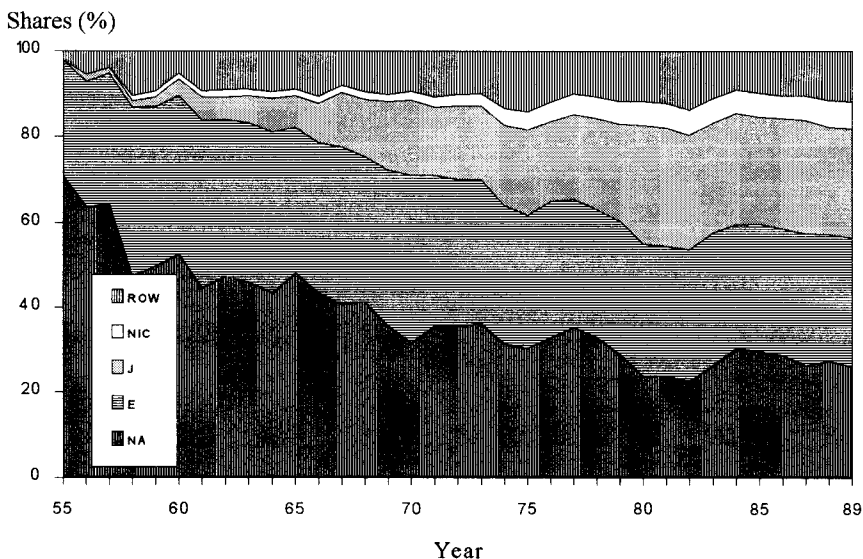
3. The US trade deficit with Japan in vehicles reached a high point of \$25.9 billion in 1986 declining to \$20.6bn in 1990. However, increasing components imports have meant that the total deficit is virtually unchanged.

4. 'Impact of strong yen depends on its stability', *Automotive News*, 1 March, 1993.

Japanese exports into the more protected European market have been at lower levels but newly established transplant facilities will be producing an estimated 1.2 million vehicles in Europe by the year 2000 (*Financial Times*, 3 September, 1992). The focus of this investment has been in the United Kingdom where new Japanese plants have led to the resurrection of the industry. Nissan plan to produce 270 000 cars from their Northern England plant in 1993 and both Toyota and Honda opened assembly plants in the UK during 1992. As has been the case in North America, earlier concerns that these would be 'screwdriver' plants using imported components have proved exaggerated. Nissan, for example, is already meeting UK requirements of 80% local (European Community) content.

Germany, the world's third largest producer, has seen output rising over the last decade with reunification providing a powerful boost. But by late 1992 the industry was in a severe slump in the face of weak export and domestic demand. The productivity gap with other European countries has been closing as the German industry managed only a 2% productivity growth rate during the 1980s. Unit labour costs have been rising at nearly 2.5% per annum during the 1980s compared to 0.5% in the UK. German 1991 compensation costs for production workers (\$28.06) are the highest in the world and compare to \$24.31 in the US, \$18.16 in Japan and \$15.14 in the UK (see Appendix 2). Opel, GM's European subsidiary, claim that it costs an additional DM750 to make the Vectra in Russelsheim than it costs for Vauxhall to make the same vehicle at Luton in England in spite of lower productivity in the UK. (*Financial Times*, 23 June, 1992).

**Figure 1.2**  
**Shares of world motor vehicle production by region**



Source: Womack et al, 1990.

One result is that all the German producers including Opel are planning to cut jobs by 5–20% over the next five years in their domestic operations. German carmakers are also looking at leaner production systems – reducing inventories and introducing team-work to achieve continuous improvement but this will be much easier to achieve at new lean plants such as Opel's Eisenach factory in eastern Germany than in existing plants with entrenched employment hierarchies and working practices.

### The major producers

General Motors remains the world's largest auto firm and although it has recently returned to profitability is closing down plants and retrenching staff as part of an unprecedented rationalization programme following record losses in excess of \$4 billion in 1991. It has announced the closure of 21 North American plants – six vehicle assembly plants, four engine and transmission plants and 11 component plants and a reduction of the workforce by 74 000 by the mid-1990s.<sup>5</sup> Apart from cutting back production in its loss making North American operations, GM has adopted a range of strategies including the shaking up of its supplier network with increased use of worldwide sourcing and reduced dependence on GM subsidiaries. This is coupled with the introduction of long term contracts and support from GM for chosen suppliers.<sup>6</sup>

Ford also sustained heavy losses in 1991 but among the American car companies has so far responded most effectively to the Japanese challenge by implementing measures to reorganize production. The Big Three US auto companies see Mexico as a growing part of their North American operations. The advantages are high productivity in their custom-built export plants in North and Central Mexico coupled with wages that are approximately one fifth of the US level. Vehicle production in North America is becoming increasingly integrated ahead of the signing of the North American Free Trade Agreement (NAFTA) which will create a free trade area of 360 million people. Vehicles built in any one of the NAFTA countries (Mexico, USA and Canada) but sold in any of the other two will eventually require 62.5% North American component content to avoid duty.

Seven Japanese firms now rank among the world's 18 major producers (Table 1.3) and Toyota is widely regarded to be the most efficient of the volume producers. This has not shielded it from recession and its worldwide pre-tax profits slumped by 40% in the year ending June 1992. The 1990s will probably see the high point of Japanese output (at least in volume terms) and expansion will increasingly take place outside Japan. Japanese car producers have traditionally concentrated production within the home country to a far greater extent than American or the major European producers. This was the case especially for the largest producer, Toyota, which in 1988 produced 89% of its output in Japan.

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5. World Car Industry Survey, *Financial Times*, 20 October 1992.

6. 'Detroit feels whip hand of the Lopez revolution', *Financial Times*, 1 October 1992.

Japanese firms are now rapidly globalising their activities in North America and Europe where not only production capacity but also design capabilities are being developed. Increasingly, Toyota along with other Japanese producers is also investing in developing countries. Another trend among the major Japanese producers is the move upmarket as part of a broader attempt to improve profitability rather than just gain market share.

**Table 1.3**  
**Leading world vehicle producers, 1992.**

Manufacturer	Cars	Commercial vehicles	Total pdn. (millions)
General Motors	5.0	1.9	6.9
Ford	3.8	1.9	5.7
Toyota	4.0	1.2	5.3
Volkswagen	3.2	0.2	3.4
Nissan	2.3	0.8	3.1
Fiat	2.0	0.3	2.3
Renault	1.8	0.3	2.1
Chrysler	0.8	1.3	2.1
Peugeot-Citroen	1.8	0.2	2.0
Honda	1.7	0.1	1.8
Mitsubishi	1.1	0.5	1.6
Mazda	1.1	0.3	1.4
Suzuki	0.7	0.3	1.0
Hyundai	0.7	0.2	0.9
Mercedes-Benz	0.5	0.3	0.8
VAZ (Lada)	0.6	0.1	0.7
Isuzu	0.1	0.5	0.6
BMW	0.6	-	0.6

Source: *Financial Times Survey*, The World Car Industry, 9 September 1993

Volkswagen is the only European producer with a true multinational presence.<sup>7</sup> Ambitious investment plans to raise production to 4.5 million units by 1997 (1992 was a record year with 3.5 million units sold) have been cut back in the face of recession and huge losses sustained in 1993. VW is now engaged in a campaign to reduce its high production costs. Labour costs, at 25% of sales, are among the highest in the industry and compare to 17% for the French carmakers, the next highest cost producers. VW, very much a mass producer in the Fordist mould (albeit a highly efficient one) also faces the problem of

7. This section draws partly on interviews with senior management at Volkswagen AG in Wolfsburg, conducted in 1992.

developing a viable response to the Japanese challenge of lean production, whether this be along the lines pioneered in Japan or a uniquely German model (Mair, 1991).

VW regard Germany as a high cost production centre and the only significant additions to domestic capacity will be in eastern Germany. New investments, albeit on a reduced scale compared to the grand plans of the early nineties are taking place in Mexico, Spain, China and the Czech Republic where the Skoda plant is being modernized.

VW see Mexico as the most cost efficient production site followed by the Czech Republic and Portugal whereas Spain has become less competitive as wages have risen to approximately half the German level.<sup>8</sup> South Africa was not seen as having many advantages as a site for new investment. Even assuming that a political settlement is reached, remaining problems include the uncertain policy regime, the high cost of raw materials, the small market in relation to the number of producers, low labour productivity and the high cost of local components. Labour costs are clearly an important factor in Volkswagen decision making and their long term strategy will see the German share of output falling as production moves to lower cost locations. At 59% of its global production, VW already has the lowest home market share of any major producer.

The locational decisions of the multinational producers clearly have massive implications for developing country industries. At the same time, it is clear that one cannot generalize about the various strategies of the major firms. Of the principal producers, Volkswagen is the only one to have located over 15% of its production in developing countries.

Japanese firms are investing heavily in the US with great success whereas VW has been unsuccessful and recently closed its only production facility. The other European producers are much more dependent on their home markets and will struggle to adapt to growing competition from, for example, the new UK based Japanese transplant firms.<sup>9</sup>

Volkswagen's main assembly facilities are located in northern Germany, a substantial distance from the main centres of German component production. The production of components is being shifted increasingly onto outside suppliers. Current levels of vertical integration (around 40% of the production process is performed in-house) are being reduced to 25% in the new east German production sites (*Financial Times*, 23 June, 1992). The company also sees global sourcing growing in importance. Long distances, while a disadvantage are by no means an overriding obstacle. One example is the expansion of imports of Mexican made engines into Germany. Initially these were uncompetitive but are now highly competitive even taking transport costs and duties into account. Senior management at VWAG regard the South African components industry as generally uncompetitive but with some notable exceptions and it was felt that new world scale projects could compete effectively. The main potential strengths were seen to be in labour intensive components or where there was a high raw material content.

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8. Interview with PJ Weber, Executive Director of Subsidiary Companies and Projects, Volkswagen AG. Since the interview in April 1992 the Mexican plant has had a major strike and run into quality problems.

9. The Nissan plant in the north of England is regarded by many observers to be the most efficient in Europe.

Even the German luxury carmakers are looking to increasing non-German production and sourcing in response to rising domestic costs. BMW are, for example, building a 70 000 car a year plant in the US. The main reason is to get closer to their second largest market but an additional factor is that according to BMW, production costs are approximately 30% less than in Germany (*Financial Times*, 24 June, 1992). They are also considering substantially expanding production at their South African plant (see Chapter Four). Mercedes also plans to build a plant in the US.

### **2.3 Investment, production and policy in developing countries**

The assembly and production of cars has increased dramatically in developing countries during the last three decades (Table 1.4). This is likely to continue with major new investments under way in countries such as Mexico, South Korea, Taiwan and Thailand. South Africa was the leading developing country producer in 1960 but now ranks sixth. Both Brazil and Argentina have experienced major declines in output during the 1980s and the latter provides a good benchmark for a failed auto industry.<sup>10</sup>

As markets have grown in developing countries, many have sought to foster domestic auto production through implementing protectionist policies. In nearly all follower countries the industry goes through a series of stages (Viljoen, 1993):

1. Infancy – assembly only
2. Limited local content – localization of certain components such as glass, tyres, batteries etc is enforced through local content requirements.
3. Higher local content – industry seen as an engine for industrial development. Imposition of higher local content requirements sometimes in excess of 80% and ‘people’s car’ initiatives in some instances. Some countries have initially tried to achieve high local content but have then gone straight to stage 5.
4. Restructuring and Rationalisation – both component producers and assemblers become subject to criticism for being overprotective. There may be attempts to rationalise the industry by reducing the number of makes/models and standardizing certain components.
5. Deregulation and export promotion – may result from failure of attempts to rationalize industry. Protection on CBUs and local content requirements are reduced. Exports of components and CBUs can be offset by greater imports.

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10. See Cardozo (1989) for an account of the problems in the Argentine automotive industry.

**Table 1.4**  
**Production and assembly of cars in developing countries, 1960–1990 (000 units)**

	1960	1970	1980	1990	LOCAL CONTENT % 1988
<b>LATIN AMERICA</b>					
Brazil	62.2	343.7	977.7	682.1	>90
Argentina	30.3	163.4	204.4	81.1	>90
Mexico	24.8	136.7	303.0	598.1	60
Venezuela	6.5	48.0	94.0	21.5	26
Chile	–	20.7	29.0	3.1	na
Colombia	–	7.7	43.0	31.5	45
<b>ASIA</b>					
India	19.1	37.4	30.5	218.6	62
South Korea	–	14.5	57.2	986.8	95
Philippines	2.9	7.6	26.6	na	na
Taiwan	0.4	na	132.0	277.4	50–60
Malaysia	–	7.5	81.0	44.5	18–22
Iran	2.5	31.8	80.0	na	na
Indonesia	2.0	2.0	41.0	33.8*	na
Thailand	–	6.6	25.0	28.8*	54
China	–	–	–	15.9*	12.5
<b>AFRICA</b>					
South Africa	87.4	195.0	277.0	209.6	55
Nigeria	–	7.1	151.0	na	15–30
Notes: na indicates data not available					
* indicates 1987 figures					
Source: Jones and Womack, 1985; O'Brien, 1990; SMMT, 1990; VDA, 1990.					

## South Korea

The pace of the development of the Korean industry has been dramatic. Founded in 1962, it produced 1.2 million cars in 1992 and has ambitious plans to further expand production. The industry grew under heavy protection from imports and was export oriented from the early 1970s. Government policy played a major role in the pursuit of a strategy which maximized independence from established OECD producers. Thus the first indigenous model, Hyundai's Pony, was introduced as early as 1975 and later versions (Pony Excel) were extremely successful in the US market. Hyundai is likely to join the ranks of the major international producers during the 1990s as it moves into the areas of design and automation technology and by 1989 had already opened an assembly plant in Canada.



Korea avoided the pitfalls of many developing country producers by specializing in a fairly narrow range of vehicle types and producing these in high volume (Oman, 1989). The state allocated certain market segments to the three major producers and new entrants were restricted. Production for export was focused on low cost subcompacts for the North American market. In the earlier stages, Korea had a major advantage in terms of labour costs although rapid wage increases since 1987 have reduced this advantage. Hourly compensation costs for production workers rose from 10% of the US level in 1987 to 26% by 1991 (see Appendix 1)

Rapid productivity growth was spurred by the pace of expansion. The share of exports in total production reached 65.6% in 1986 (Jo, 1988:43) but the domestic market is now growing in importance and rapidly rising incomes and a reduction in purchase taxes which kept rates of car ownership low<sup>11</sup> have enabled domestic market expansion to cushion more recent problems in the export sphere.

The most critical problem facing the Korean producers is the technical constraints that they face in the areas of design and production automation where they are still far behind their advanced country counterparts. Heavy expansion by existing producers and new entrants in the face of worldwide overcapacity is a further problem as is the relative backwardness of the components sector which is now being rationalized and consolidated with a rapid increase in licensing arrangements with foreign manufacturers.

### ***Box 1.1*** ***Import liberalization - Korean style***

Until recently, Korea has followed a policy of supporting exports and heavily taxing domestic sales. The market remained virtually closed to foreign vehicles even after the outright ban on imports (it still applied to Japanese cars) was lifted in July 1987. However, only ten foreign cars were sold in Korea during 1987 because of a web of taxes and other restrictions. Even with the reduction in tariffs from 60% to 30% in 1988, a Mercury Sable with a US wholesale delivery price of \$15 000 would cost a Korean buyer \$53 700 with the price inflated by special taxes and duties such as defence taxes (\$ 2 305), special excise tax (\$6 350), acquisition taxes \$4 800), value added tax (\$4 880) and high administrative expenses.

Potential customers not deterred by the inflated cost still had to contend with a media campaign suggesting that buyers of imported vehicles would be subject to income tax audits!

(Ward's Automotive International, February, 1989).

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11. The Korean government has historically discouraged domestic purchases of vehicles partly through the imposition of high taxes. In 1986 taxes on purchases of cars were 46.5% in Korea, compared to 24.4% in Japan and 14.0% in W.Germany. Taxes on annual operation were also high (Jo, 1988:44)

## **Mexico**

The success of the Korean industry was to some extent predicated on rapid expansion in the economy allowing high rates of investment and the rapid expansion of domestic demand. Mexico has managed to restructure its auto industry under far more adverse circumstances of external indebtedness and domestic economic contraction.<sup>12</sup> Growth has depended primarily on heavy investment by transnational rather than indigenous assembler firms as was the case in Korea.

Domestic sales plummeted from 600 000 units in 1981 to 240 000 in 1987 (O, Brien, 1990:55) but exports of vehicles increased from 14 000 to 162 000 units during this period rising further to 279 000 in 1990. Component exports have risen slightly less rapidly but still accounted for 43.5% of total automotive exports (Economist Intelligence Unit, 1991a:89).

Starting from a position of heavy protection and controls on foreign investment in components the policy decrees of 1977 and 1983 established the principle of foreign exchange balancing allowing a lower degree of local content to be offset by greater exports. It also sought to rationalize the supply structure through reducing the number of producers and models although the latter objective has not been achieved. The Automotive Decree of 1989 has accelerated the process of trade liberalization and international integration particularly into the North American market as it freed up imports of components and vehicles as long as foreign exchange balancing requirements were met. Regulations governing entry authorizations and the restrictions on makes and models were eliminated.

With wage rates that remain low, access to the North American market and impressive productivity levels in new plants,<sup>13</sup> Mexico has become one of the most favoured sites for investment by multinational producers and component firms. The US Big Three, Nissan and VW are all investing heavily. To some extent the incentive structure has encouraged the cross-subsidisation of exports via higher domestic prices and it remains to be seen whether sustainable real competitiveness can be achieved.

## **Brazil**

As has been the case in Mexico, the rapid expansion of the Brazilian industry during the 1960s and 1970s was halted by macroeconomic problems and the external debt crisis which led to the collapse of domestic demand during the 1980s. In the Brazilian case this has only partly been compensated for by exports and production has only recently surpassed the level achieved in 1980.

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12. For a recent account of the shift from import substitution to export promotion in Mexico (and Brazil) see Shapiro (1993).

13. See Shaiken (1990) for a detailed study of the impact of new technology and production reorganisation in Mexican assembly plants.

Low capacity utilization, low levels of automation and some outdated products with poor manufacturability contribute to low productivity (see Figure 1.3) which is only partly compensated for by low wages (Ferro, 1989). In some plants reasonably lean production has been achieved<sup>14</sup> but the main problem remains macroeconomic instability and decline which have retarded investment.

Faced with these problems, an interesting development has been the establishment of a high level forum consisting of private sector, government and labour representatives to develop a strategy to raise the competitiveness of the country's automotive industry.<sup>15</sup> It consists of a short term strategy aimed at the regeneration of domestic demand through a combination of reduced taxes on vehicle purchases, wage restraint and the holding down of prices by manufacturers to be followed by the development of a longer term strategy to improve competitiveness. New car taxes were recently slashed in a move which will bring car prices down by 10% as part of the plan to make cars more affordable for Brazilians.<sup>16</sup>

## Taiwan

Taiwan is another country with a rapidly growing automotive industry which also faces the problem of a history of protection which has resulted in a proliferation of relatively small scale producers. In 1987, seven producers competed in a market of only 220 000 vehicles. Cars were priced at well above international levels protected by a 55% tariff and a ban on Japanese imports.

However, Taiwan did not adopt the high risk Korean strategy of promoting the rapid development of a few large scale export oriented producers. It has followed a policy of first developing the components sector to be internationally competitive and this now provides a viable basis for the production of built up vehicles for export. In terms of the six year programme introduced in 1985, the components industry was encouraged through a range of measures including export assistance, local content requirements<sup>17</sup> and tariff protection, support for R&D and the establishment of national standards for automotive components (Bosman, 1992). Under the programme, protection on CBUs was reduced from 65% to 30–50%.

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14. For a detailed account of new production organization in the Brazilian components industry see Posthuma (1991).

15. 'Jump-starting the Brazilian car industry', *Financial Times*, 6 March, 1992.

16. 'Brazil cuts new taxes', *Automotive News*, 1 March, 1993.

17. These include regulations specifying that five of the following components had to be produced in Taiwan: cylinder block, cylinder head, crankshaft, camshaft, piston pin and connecting rod, clutch system, gear for transmission, gearbox, drive axle, steering wheel and column, gear for steering, brake system, door, chassis or cross frame, bonnet or boot lid.

## **Box 1.2**

### ***Sanyang - a Taiwanese assembler***

Sanyang Industry Co provides an interesting contrast to South African assemblers. It started production of small motor cycles and scooters in 1962 and since 1969 has been producing cars under licence from Honda. Annual output of approximately 60 000 vehicles is spread across two basic models the Sanyang Civic and Accord. There are 900 production workers involved in car assembly. Final assembly is fairly labour intensive with automation hindered by the relatively wide variety of products and the need to be highly flexible. Sanyang produces cars for the domestic market and due to a lack of economies of scale, the Sanyang Civic sold in Taiwan was approximately 50% more expensive than the Civic produced by Honda in Japan. Local content levels of 50% for the Accord and 70% for the Civic are also comparable to South African local content levels. There are three main areas of contrast with South African assemblers which are of a similar size and also reliant on foreign technology and components.

#### **Shop floor relationships**

Labour productivity in the Taiwanese plant is considerably higher based on simple comparisons of output per production worker and management spoke well of relationships with the workforce. Underlying these comparisons are a number of important differences between the two systems. A very striking difference is the much less hierarchical employment structure of the Taiwanese plant. Starting monthly salaries for production workers of NT\$ 22 000 (R2 300) per month were only some 30% less than starting salaries for young university educated engineers going into management. As a matter of course, it is expected that prospective managers would spend time working on the production line and career opportunities for production workers are much greater than in South Africa. The director of the plant we visited had in fact started work as a production worker 30 years earlier. Thus the fact that all employees including senior management wear overalls is not just a window dressing gesture. The young workforce are highly educated and receive 40 days training before starting work. Also, there had never been any retrenchment from the plant. The average monthly income of production workers was NT\$ 25 000 (R2650) and this was augmented by substantial annual bonuses which averaged 1.5 months salary as well as monthly production related bonuses. The bonus paid out in the month previous to our visit (the highest production level ever) had been equivalent to 13 days additional pay. Wage increases for the past 5 years had exceeded 10% per annum in real terms.

#### **Links to suppliers**

Taiwanese motor firms have developed a network of centre and satellite suppliers similar to the Japanese system. Considerable effort is invested by assemblers in improving the capabilities of suppliers who are linked in through long term agreements. All suppliers were graded in terms of quality and 'A' level suppliers were rewarded by receiving monthly payments 30 days earlier. Sanyang Motor Co. dealt directly with only 170 component firms. They had benefitted from government assistance to component firms to locate close to the assembly plant. Nevertheless, the just-in-time system was not fully developed and applied only to key components with delivery of other components on a 2-3 day basis. The main constraints on a more developed JIT system were fluctuating production levels and heavy traffic congestion. Nevertheless, it represented a considerable advance on the South African system.

#### **Emphasis on R&D**

Although it relied extensively on technical support from Honda, there was a heavy emphasis on R&D within the firm and Sanyang had reached a level of being able to perform all its own R&D in the design and production of motor cycles. The R&D division included 200 specialist personnel out of a total staff complement of 4 000 and R&D spending accounted for 2% of turnover again much higher than in South African assembly plants. Sanyang was able to benefit from generous tax incentives for investment in R&D and also made use of the expertise of the Industrial Technology Research Institute (ITRI), Taiwan's equivalent of the CSIR.

Local content requirements are being further reduced and limited Japanese imports will be allowed in terms of the new Automobile Development Industry Plan announced in 1992 (*China News*, 10 September, 1992). Improved competitiveness is now being spurred by reduced protection accompanied by a host of complementary measures aimed at increasing investment in R&D, improving links between assemblers and suppliers and also increasing the scale and volume of production. To some extent, Taiwan's low volume assemblers have been able to turn the small scale of operations into an asset by targeting foreign niche markets for small runs of vehicles such as Chung Hwa Motors' Wei Li small van which is being sold to Germany where it will be fitted with an electric motor (CETRA, 1992).

There is a heavy emphasis on R&D which receives strong support from government. In response to rising auto imports, the Taiwan Transportation Vehicle Manufacturers Association has developed a 10 year plan to raise R&D expenditure from the 1990 figure of 1.5% of total spending to 3.25% in 1995 and 5% by the year 2000.

Government and industry have collaborated closely in the development of the industry. One example is the engine development programme which aims to compensate for the small size of Taiwanese firms and resulting relatively limited R&D capabilities and reliance on Japanese design (CETRA, 1992). The common engine programme will bring together manufacturers and government agencies to develop three standard engines which are anticipated to cut production costs by 30%.

## Australia

Australia is a developed country with a long established automotive industry. However, its history of protection, its limited market and its fragmented production structure give it much in common with developing country industries. Low volumes and multiple models also impact on the component industry and both South Africa and Australia suffer from what Lamming (1990b) terms the 'transplant/outpost' problem.<sup>18</sup>

By the early 1960s, very high levels of local content and reasonable production volumes had been achieved in certain makes, in particular, the Holden which was the market leader. At this time the tariff on imported vehicles was 35% but pressure from imports (especially of smaller vehicles) and declining industry performance led to the imposition of higher levels of protection which by 1975 reached 57.5%. An export facilitation scheme was also introduced for assemblers and component producers in 1982 as the industry sought to more closely integrate with the world industry as a way of circumventing the problem of the small domestic market. This allowed producers to reduce local content in return for automotive exports.

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18. Lamming cites the example of a car built at an annual rate of 20 000 in Australia but at a rate of 750 000 in Japan. This puts the low volume Australian component producer in the difficult situation of competing with imports from the high volume Japanese supplier shipped in at marginal cost.

Problems of frequent changes to policy, inward orientation and the cost of protection remained.<sup>19</sup> As a response to these problems the Button Car Plan was introduced in 1985. It had three objectives which are still regarded as guiding principles today (AIA, 1992:8).

- To increase the industry's production efficiency to allow it to compete with imports at lower levels of assistance.
- To give consumers access to better quality and more affordable cars.
- To minimize disruption to production and employment during the transition to a more efficient industry.

The major strategies to achieve this are still in place with some modifications:

- increased competition achieved through a phased reduction in tariffs to 35% in 1991 and down to 15% by the year 2000.
- local content requirements have been abolished.
- improvement in plant and model volumes to be achieved by increasing specialization through export facilitation and penalizing low volume production.

Directive measures to make the industry more efficient are of particular relevance to South Africa. A target industry structure (three manufacturing groups and a maximum of six models) was specified for 1992. Penalties in the form of higher duty on imported components were applied to low volume models (Industry Commission, 1990). Average production volumes per model have risen significantly since the plan was introduced.

Australia has thus followed a route of quite rapid integration into the global industry and both imports and exports have risen sharply. In 1991, imports accounted for 45% of the total market of 511 000 cars and trucks while 27 000 cars were exported.<sup>20</sup> Both the assembly and component industry have become smaller (in terms of number of firms and employment) but these firms are better able to cope with increased international competition. A number of world class component suppliers have emerged although most are foreign owned.

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19. Even at the end of the decade by which time substantial liberalization had taken place the Industry Commission reported that assistance to the industry cost the country A\$1.6 billion per annum, an effective subsidy of A\$25 000 for each of the 60 000 jobs in the industry.

20. 'Australia may go down under', *Automotive News*, 28 Dec 1992.

## Conclusion

Most developing country industries were initiated by heavy protection which encouraged investment by multinational producers. They were characterized by high costs exacerbated by stringent local content programmes which met only with limited success in reducing trade deficits within this sector. These trends are now changing as countries try to integrate themselves into an increasingly internationalized system.

In the automotive industry the adoption of independent national strategies is especially problematic. The industry is dominated by a handful of multinational producers whose size and technological lead makes the prospects for independent new entrants remote. Korea is the only developing country which has been able to successfully pursue a strategy of promoting indigenous carmakers and that was only with technological and design tie ups to MNCs, the massive resources of the *chaebol* and active state support.<sup>21</sup> This is not a strategy which can be easily replicated, however, and most countries will have to deal with MNCs, seeking deals which try to maximize technology transfers while ensuring that the scope of operations of local subsidiaries are not restricted by parent company strategies.

All the other major producers in developing countries have close linkages (usually as wholly owned subsidiaries or joint ventures) with OECD based MNCs. The locational strategies of these MNCs are, therefore, of critical importance to the future prospects of the various developing country industries. This is made all the more evident by the locational strategies of the major international component firms which in many cases tend to follow the assemblers to new locations.

The way in which developing countries have managed the relationship with the major MNCs has been crucial. Many countries, South Africa included, initiated assembly governed by local content programmes and attracted foreign investment on this basis. MNCs were able to operate profitably as small scale assemblers for the local market using a certain percentage of domestically produced (high priced) components. But under this regime, the MNCs kept these subsidiaries isolated from their global production networks. For most developing producers, even those with large domestic markets, the future of the auto industry is to an important extent dependent on securing a growing niche within these global networks.

## 3. Major trends in the automotive industry

This section explores new developments in the international auto and components industry focusing on how they impact on the competitiveness of developing country producers. It also considers the reasons for the competitive strength of Japan and the implications for other national industries.

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21. The jury is still out on ventures such as Malaysia's Proton.

### 3.1 'Lean production'

Most analysts attribute Japanese success to the emergence of superior forms of production organization, product development and supplier co-ordination which now constitute best practice and are demonstrably more effective than traditional mass production. This view has received its most influential statement in the publication of the findings of the MIT based International Motor Vehicle Program (IMVP) which coined the term 'lean production' to describe the system which was pioneered by Toyota (Womack et al, 1990). The main elements of this system are now well known<sup>22</sup> and can be grouped around three principles: continuous improvement, teamwork and flexibility.

One or more of the above principles are contained in the various specific elements of lean production. For example, the just-in-time (JIT) system which enables parts to be delivered just as they are needed is in part a system for reducing inventories but the fine tuning it requires also means that bottlenecks and quality problems can be quickly identified and eliminated.

Strict job demarcation has been abolished and workers are able to perform a range of tasks including the monitoring of product quality which eliminates the need for expensive quality checks at the end of the production process (total quality control). This has also reduced the need for specialist indirect labour such as quality controllers, supervisors and specialist functions such as machine setting and the changing of dies.<sup>23</sup>

Workers are integrally involved in the continuous improvement of productivity (*Kaizen*) as illustrated by the extensive use of elaborate suggestion schemes. In 1983 Toyota workers submitted no less than 1.6 million suggestions (an average of 32 per worker) of which 96% were implemented (Hoffman and Kaplinsky, 1988). The Japanese system has thus been able to draw much more effectively on the accumulated shop floor experience of the workforce and translate this into higher productivity.

This more cooperative relationship was also carried through to the relationship between assembler and supplier firms. Assembly accounts for only 15% of the total manufacturing process and the traditional mass production approach tended to vertically integrate component manufacture within the parent firm or its subsidiaries (up to the level of 70% in the case of General Motors) or tender out parts production on the basis of detailed blueprints. Suppliers were not integrally involved in the design of components for new models. The conventional mass producers also tended to maintain a few suppliers for each component playing them off against each other to bring down costs.

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22. The elements of the system are only briefly mentioned here. For comprehensive accounts see Womack et al, 1990; Hoffman and Kaplinsky, 1988; Cusumano, 1985.

23. Quick changing of dies was one of the critical early innovations introduced by Toyota. Die changing in dedicated high volume western press lines typically took a full day. By the late 1950s Toyota had reduced this to 3 minutes which not only allowed small batch production but enabled inventories to be reduced and defects to be discovered much more rapidly (Womack et al, 1990)



The typical Japanese assembler on the other hand produced a far smaller share of its own components and worked much more closely with primary (first tier) suppliers who had considerable responsibility for research and development within a set of broadly defined requirements.

The above approach was carried through to product development through the integration of product and process engineering leading to the design of vehicles which were much easier to manufacture as well as reducing lead times on new models. The result was a much more flexible and responsive production system which allowed Japanese producers to change models rapidly.

Two questions arise from this brief discussion. Firstly, what has been the productivity impact of lean production and, secondly, how transferable is it to other situations particularly in developing countries? Womack et al make bold claims on behalf of lean production. According to this view the system is so much more efficient that it really represents a new paradigm in manufacturing using:

"less of everything compared with mass production — half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time" (1990:13).

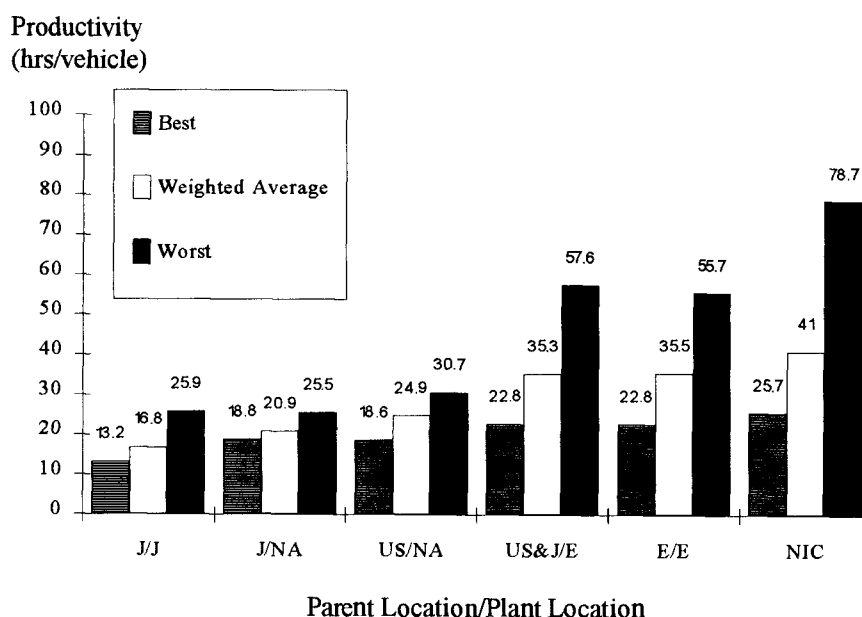
The study's findings on assembly plant productivity are shown in Figure 1.3 but both the data findings and the conclusions drawn are not without their critics.<sup>24</sup> The IMVP study uses physical output in final assembly as its main measure of productivity and non-Japanese plants are shown to be much less efficient. According to Williams et al (1992) the greater manufacturability of Japanese vehicles coupled with lower capacity utilization in non-Japanese firms account for a substantial part of the differential. This was an opinion echoed by the Verband der Automobilindustrie<sup>25</sup> who argued that the IMVP study was over reliant on physical output measures of productivity and argued that other measures would have produced better results for German manufacturers which come in for heavy criticism in the Womack et al study.

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24. See, for example, Williams et al, 1992.

25. Interview with the head of research of the Verband der Automobilindustrie (German motor industry federation).

**Figure 1.3**  
**Assembly plant productivity: volume producers 1989**



Note: Volume producers include the American 'Big Three'; Fiat; PSA; Renault; and Volkswagen in Europe; and all of the companies from Japan.

J/J = Japanese-owned plants in Japan

J/NA = Japanese-owned plants in North America; including joint venture plants with American firms;

US/NA = American-owned plants in North America;

US&J/E = American- and Japanese-owned plants in Europe;

E/E = European-owned plants in Europe;

NIC = Plants in newly industrializing countries: Mexico, Brazil, Taiwan and Korea.

Source: Womack et al (1990:85).

The thrust of the Williams et al (1992) view is, firstly, that productivity differentials are far less dramatic than is claimed by Womack et al (1990), with Toyota being the important exception. They argue that factors such as lower wages more than 'lean production' have accounted for Japanese competitive success. Japanese wages in large scale automotive firms have now caught up with those of the US but differentials are still large in components because of the relative prevalence of small firms in the Japanese components sector as well as the exceptionally steep wage gradient between small and large firms. Williams et al (1992) conclude that the:

"competition between Japan and America in car production is not a contest between systems of inherently different efficiency; it is more like sumo where the off balance wrestler is forced out of the ring".

Other critics have argued that the Womack et al (1990) claim that lean production requires less effort and leads to a greatly enhanced work environment is also exaggerated with studies pointing to the high intensity of work in Japanese plants whether in Toyota, Japan in the early 1970s (Kamata, 1982) or Japanese transplants in North America in the late 1980s (Berggren et al, 1991).

Nevertheless, there is by now a vast array of evidence which documents the efficiency enhancing characteristics of new forms of production organization pioneered mainly in Japan but being applied in a wide variety of ways in auto industries around the world.

### **The transferability of lean production**

Japanese transplants have now been operating in North America for over 10 years. These plants were established with a view to incorporating the form of production organization used in parent plants in Japan and now account for nearly a quarter of automotive production in this region. According to the IMVP World Assembly Plant Survey, productivity in Japanese plants in North America (20.9 hrs/vehicle) was only slightly below that of Japanese plants in Japan (16.8 hrs/vehicle) (Figure 1.3).

The first greenfield Japanese transplant in Europe, the Nissan plant in northern England, began production in 1986 and is regarded by some to be the most efficient plant in Europe.<sup>26</sup> In addition, Japanese firms have established a number of joint ventures with US and European firms, the best known of which is the New United Motor Manufacturing Inc. (NUMMI) plant in California, a joint venture between General Motors and Toyota. This plant produces Toyota designed cars in a reopened GM facility using the Toyota Production System and has achieved quality levels equal to Toyota's Takaoka plant and productivity levels which are almost equivalent. According to an IMVP study by Krafcik (1986), workhours per unit were 19.6 in NUMMI, 18.0 at the Takaoka plant in contrast to 27.6 at GM's old Framingham plant. It is also clear that American firms, particularly Ford, are starting to respond effectively to the Japanese challenge and as Figure 1.3 indicates, the best American plants now have productivity levels equivalent to average plants in Japan.

### **Lean production and the implications for developing country producers**

As we have illustrated above, it has now been clearly established that the principles of lean production can be transferred to western producers. More important for the purposes of this report is the question of the transferability to developing country producers. It could

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26. The competitive threat posed by this and other new Japanese transplants in the UK led the Peugeot chairman to refer to Britain as a "Japanese aircraft carrier off the coast of Europe".

be argued that hierarchical forms of job grading, shop floor conflict and low educational levels such as in South Africa impose particularly difficult constraints on the introduction of a production system which is essentially dependent on a much more motivated workforce.

There are, however, many examples of lean production being successfully adopted in developing countries. One such case is the Ford factory in Hermosillo, Mexico which produces a Mazda designed car and has implemented new forms of work organization very effectively (Shaiken, 1990).

The New Auto Quality Study on Competitive Makes (NAQSCM) found the Mercury Tracer produced at Hermosillo to be the highest quality small car produced in North America together with the Honda Civic (Shaiken, 1990:24).<sup>27</sup> Of the five factors cited as being important to the vehicle's success, three (a high quality workforce, good training and the emphasis on team production) were related to the organization of production. Management described the carefully screened workforce as highly motivated and well educated. Educational qualifications are exceptional for a developing country auto plant with 90% of the workforce having at least a high school education and one third having had some university or professional school education. Training levels are also high with all new workers receiving four months of intensive training before starting work (Shaiken, 1990:75).

The firm has been highly successful at adapting new forms of production organization to suit Mexican conditions. For instance, it maintains an adapted JIT system in spite of being reliant on Japanese and US suppliers for the bulk of components. Japanese suppliers send components to a consolidation centre in Japan which collects parts into daily production packs which are then shipped to the Mexican plant (Shaiken, 1990:38-39). The Hermosillo plant operates with a very flat hierarchy of skill categories with a heavy emphasis on team work. Multiskilling allows for flexibility to the extent of rotating workers through production and skilled (eg. maintenance) jobs.

One detailed comparison of Ford plants in Sao Bernado (Brazil) and Dagenham (UK) argued that reorganisation may in fact be easier in the developing country context because plant demarcation lines did not exist in Brazil as indicated by the existence of a single union (Silva, 1992). Brazilian workers also had a tradition of more flexible working patterns than was the case in British plants. The study found that productivity levels in the three assembly processes (body construction, painting and final assembly) were very similar in spite of the fact that the Dagenham plant was more highly mechanized. Quality levels were slightly higher in the Brazilian plant. These differences were attributed to improved work organization which has been more rapidly introduced in the Brazilian plant. It also concluded that automation without the requisite changes in work organization would achieve little.

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27. This finding on quality is supported by the IMVP.

If developing countries are able to narrow or eliminate the technological and productivity gap with advanced country producers the implications are, of course, extremely important for the location of investment in sophisticated manufacturing processes.

## Automation

Vehicle assembly is a complex process. It involves three basic processes – welding the body, painting and final assembly. The process has become increasingly complicated given the growing variety of major and minor model variations that are produced in a modern plant. The latest Ford Escort being built in the UK, for instance, has more than a hundred variations in the bumper fitted to the car depending on colour and specification (*Financial Times Survey: Vehicle Manufacturing Technology*, 5 June, 1992)

In the typical European plant, it takes 15 hours of direct labour time for final assembly, four hours for painting and five hours for constructing the body. Automation is one important way in which labour productivity can be improved but as Krafcik (1989:3) argues "a high level of automation may be a necessary condition for very high productivity performance but it is not a sufficient condition".

In lower wage countries such as South Africa and Brazil, automation may be introduced more for reasons of improving quality than to lower costs (Krafcik, 1989). A key finding of the MIT study was that the marginal gains of additional automation are limited unless the technology is combined with policies which create both high levels of training (multiskilling) and commitment from the workforce.

The IMVP study uncovered significant regional variations in levels of automation, the way automation was applied and in its effectiveness. Typically, Japanese plants are amongst the most highly automated especially in the area of welding and painting but this in itself is not a major factor explaining higher productivity levels in Japan. Japanese automation tends to be much more flexible and allows for workers to introduce improvements in the way machinery is used (Krafcik, 1989). The more automated European plants tend to rely on dedicated automation equipment performing complex assembly processes. Thus, sophisticated machinery has been used to provide a high level of automation in the final assembly of the VW Golf in Wolfsburg. This requires vast initial investments and maintenance problems testing even for German engineering capabilities.<sup>28</sup> In spite of high levels of automation the Wolfsburg plant did not receive a high productivity rating in the IMVP international assembly plant survey.<sup>29</sup> Such plants are only cost effective if run at full capacity and may require an additional less automated plant to deal with fluctuating demand.

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28. Plant visit, Hall 54 (Golf assembly), Wolfsburg.

29. The problems that VW has encountered as it hesitantly attempts to reorganise production are graphically described by Mair (1991).

There are numerous other examples in Europe and the US where high levels of automation have not brought corresponding improvements in assembly plant productivity. On the other hand, plants run on lean production principles have achieved high productivity levels, a case in point being the Nissan plant in north England which relatively has low levels of automation but is widely regarded as being one of the most efficient assembly plants in Europe.

### 3.2 Product changes

New product development is taking place at an increasing pace with new models being introduced more quickly and in greater variety. Two major trends are the greater use of electronics and changes in material content. By the year 2000, electronic items will account for an estimated 20% of the value of a passenger car (Karmokolias, 1990:14) playing a part in every aspect of the driving process and may even include gadgetry such as electronic 'shells' which allow cars to communicate with each other and holographic windscreen displays capable of presenting essential information and potential obstacles ahead.<sup>30</sup> The vast increase in componentry required will open a wide range of opportunities for developing countries.

One emerging area where South Africa has developed some technological capability is in the advanced battery systems required for electrically powered cars, the importance of which will grow rapidly in the next decade. Regulations introduced in 1990 in California require that at least 10% of all the vehicles sold in the state by each manufacturer by the year 2003 be zero emission vehicles. Japan will have an estimated 200 000 electric cars by the year 2000. Worldwide annual expenditure on electric cars already exceeds R23 billion.<sup>31</sup> All the major carmakers are developing electric cars, either individually or as joint ventures with other producers.

Eskom is quite far advanced in its work on an electric car and is negotiating with local manufacturers about bringing it into production. Anglo American, together with Daimler Benz subsidiary AEG, has developed the high density Zebra battery as a power unit for electric cars and limited production will begin this year – in Germany.<sup>32</sup>

### 3.3 New materials

Shifts in material usage and the introduction of new composites also have implications for developing country producers. New materials are being introduced because they offer possibilities for product differentiation and flexible manufacturing as well as bringing down costs and reducing vehicle weight in accordance with fuel economy and environmental considerations (Graves, 1992). New materials include advanced metals and alloys, fine ceramics, plastics and polymers and a variety of composite materials.

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30. 'Battlefield wizardry takes to the roads', *The Independent*, 11 May, 1992.

31. 'Electric cars hit the roads', *Engineering News*, 4 December, 1992

32. 'SA battery to be made in Germany', *Engineering News*, 26 March, 1993.

The overall impact on the usage of metals is of potential importance for mineral rich South Africa's component sector. One expected development with important implications for South Africa is that aluminium usage in cars is rising rapidly. One estimate is that the average car is expected to contain 30% more aluminium by 1997–1998.<sup>33</sup> Reynolds Metal, the second largest US aluminium company expects aluminium usage per vehicle to double by the year 2000 and to increase far more rapidly if aluminium frames and body panels become widely used.<sup>34</sup> Plastics may account for as much as 17% of body weight by the year 2000 while iron/steel usage is set to decline to 60% from its current level of 65%.

### 3.4 The scale of production

Most developing country industries including South Africa have grown on the basis of a protected domestic market and because these markets are relatively small, the issue of minimum efficient scale is critical. This problem has been exacerbated by the resultant tendency to attract a large number of firms which engage in final assembly but are producing at very low and inefficient volumes. It is widely acknowledged that this is a critical problem in the South African industry which has seven producers, some of which produce more than one make apart from a wide range of models. This is a very high degree of fragmentation for an industry which produced approximately 300 000 vehicles last year.

Two questions are important here. The first is the issue of minimum efficient scale in assembly and components production and the extent of cost penalties incurred if these are not achieved. The term minimum efficient scale refers to the scale of production at which virtually all available scale economies have been exhausted. The second issue is whether new technologies and related changes in production organization are leading to a decline in the optimal size of plant and firm as has been argued in a number of studies.<sup>35</sup> This section investigates these issues in relation to both assembly and the production of components.

Scale economies arise in a number of ways. Firstly, more efficient methods and advanced machinery have been developed for large scale production. For instance, a high degree of automation may only be appropriate if total output is at a high level. Secondly, unit costs can be reduced through spreading the high cost of product design and development over large production volumes. Thirdly, high production volumes facilitate greater specialization of labour and management functions which also can increase productivity. Of great importance in the South African industry is product scale.

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33. 'Car manufacturers forecast to use 40 percent more aluminium', *Financial Times*, 27 March 1992. With the construction of the new Alusaf smelter South Africa will be the world's 5th largest producer of aluminium by that time.

34. 'Aluminium producer sees its future in cars', *Financial Times*, 1 December, 1992.

35. See Alcorta (1992) for a detailed discussion of these issues.

This takes into account batch or lot size, in other words the length of the production run. Longer runs minimize machine changes and costs can be reduced by minimizing down time (Alcorta, 1992) Important savings can also be made from higher levels of capacity utilisation in existing facilities but this should not be confused with economies of scale

### **Economies of scale in assembly**

Most estimates put minimum efficient scale in assembly at 200 000–250 000 units per annum (Lucke, 1988; Bureau of Industry Economics, 1988) usually spread over no more than two basic models. New state of the art assembly plants such as those being established by Japanese producers in the United States have a capacity of 150 000–300 000 units per annum. It has been argued that minimum efficient scale could decline to around 150 000 units during the 1990s as a result of changes in technology, production processes and product mix (Womack et al, 1990; Industry Commission, 1990). The optimal scale of production tends to be smaller in speciality or luxury cars. For example, the new BMW plant in the US will have a capacity of 70 000 units per year.

Flexible machinery and production organisation is having more of an impact on the variety of models and derivatives that can be efficiently produced in one plant rather than on the optimal scale of total plant output. Thus the trend in the US and Japan (but not Europe) has been towards a gradual decline in average annual production volumes per model. An extreme example is Mazda's plant at Hofu, near Hiroshima which has been designed to make up to 18 different body types (*Economist Survey: The Car Industry*, 17 October 1992)

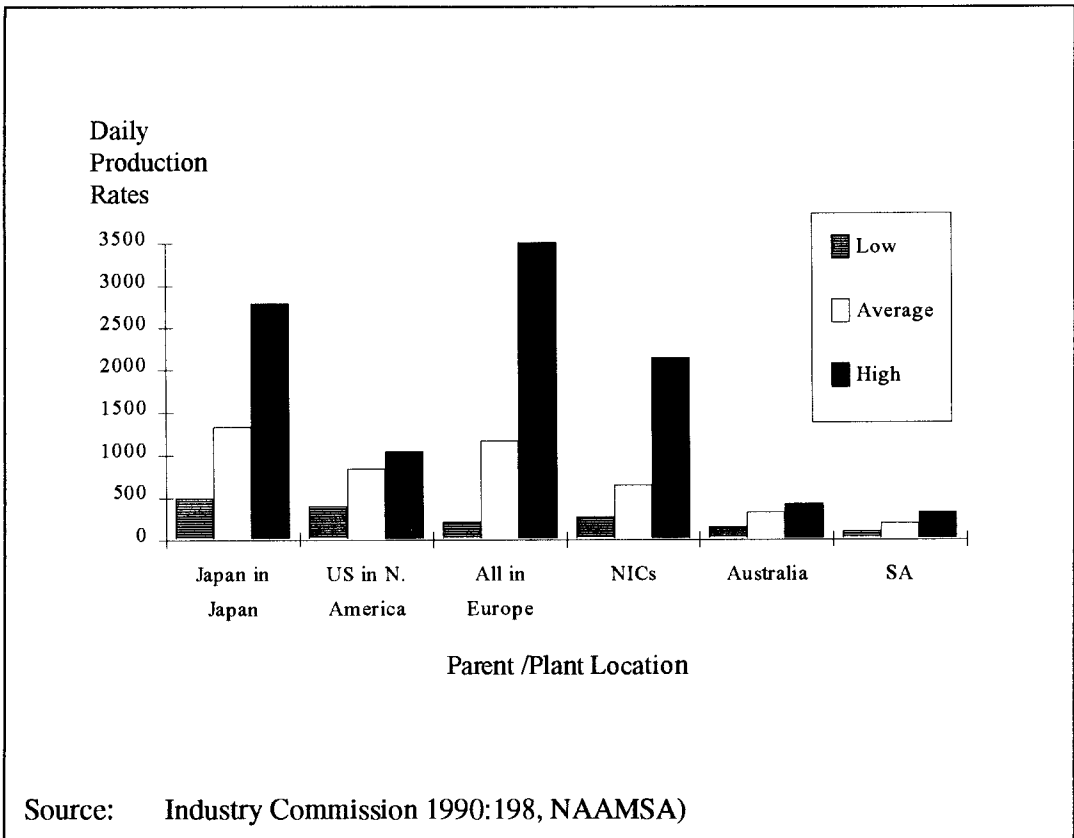
All South African producers operate at well below these levels with the largest, Toyota, producing fewer than 80 000 units last year even though its capacity is substantially higher. Furthermore, this production is spread across a wide variety of models. It should be noted, however, that South Africa is not alone in producing at levels which are well below minimum efficient scale. All developing country producers as well as the majority of developed country plants operate at below minimum efficient scale.<sup>36</sup>

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36. See Lucke (1988: Table 5) for international comparisons of production volumes by firm and model.



**Figure 1.4**  
**Scale of operation of international assembly plants (daily production rates)**



There is less consensus on the cost penalties resulting from low volume production but it is accepted that these are much lower than in component manufacture. An Australian Industry Commission report cited a study by Mitsubishi which indicated that increasing production from 50 000 to 100 000 units per annum by introducing double shifting and greater levels of automation would reduce total assembly costs by 7.5% per vehicle, equivalent to just 1% of the total cost of the car. This small cost saving results from the premium applying to second shift wages and illustrates the fact that assembly costs represent only approximately 20% of total vehicle costs (Industry Commission, 1990:200). An older study by White (cited in Lucke, 1987) found that reducing the scale of production of one model from 100 000 to 50 000 would result in a cost penalty of between 4% and 9% being incurred in the assembly process.

### **Economies of scale in component manufacture**

Given that materials and components account for the remaining 80% of total cost and that economies of scale are more significant in component production, it is clear that

increasing the scale of assembly generates greater economies external to the assembly process than internally. This has important policy implications for the South African industry as the main benefit resulting from rationalization of assemblers would be through creating opportunities for longer runs and hence reduced costs for component producers.

As Table 1.6 indicates, estimates vary widely regarding minimum efficient scale in the production of major components but are generally much higher than in vehicle assembly. These estimates refer to annual plant output rather than production runs for a single component so do not take into account the variety of products produced which is the major issue in the South African industry. Cost penalties are also difficult to determine. Studies carried out in Australia (Industry Commission, 1990) indicated that significant scale economies could be achieved by higher volume output. For instance, doubling output of engines could result in cost reductions per unit of 11–12.5%. In the case of body panels, where economies of scale are extremely important, doubling output was estimated to reduce unit costs by as much as 21% in the case of medium sized cars.

**Table 1.6**  
**Estimates of minimum efficient scale in components production**

<b>Component/process</b>	<b>Minimum efficient scale/output per annum</b>
Engine block castings	260 000–1m
Engine block machining	150 000–600 000
Engine assembly	100 000–500 000
Transmissions/gearboxes	260 000–500 000
Stampings	100 000–several millions
Body unit	200 000–400 000
Frame	200 000–206 000

Note: Above table is a summarised estimate of a large number of studies.  
\*Could be much less in the case of low volume dies

Source: Derived from Bureau of Industry Economics (1988)

If the greater flexibility of new technologies allows for descaling as has been argued this would have very positive implications for low volume producers like South Africa. Unfortunately there appears to be little foundation for the more optimistic proponents of this view as far as optimal plant size is concerned although, as in assembly, it has become possible for a single plant to efficiently produce a larger range of models and components (Alcorta, 1992).

## 4. Components

Some 80% of the value added in automotive manufacturing arises out of the production of the approximately 10 000 parts that are used to make a vehicle. The total volumes involved are enormous – Ford, the world's second largest manufacturer, alone purchased nearly \$53 billion of components in 1990.<sup>37</sup>

The total value of international trade in components has been estimated at \$57 billion in 1988 accounting for just over 15% of global production (Bowring, 1990). Because component production is so varied in terms of its capital and technological requirements, virtually all countries can find appropriate niches. The result is that there are twice as many developing countries (approximately 60) involved in component production as in assembly (Karmokolias, 1990). This section outlines the major trends taking place in component production and supply and analyses the implications for developing country producers.

Currently, the bulk of world components production is carried out in a couple of hundred components firms in each major producing region. In the EC, for example, there were an estimated 3250 components firms but the 138 large firms (more than 1000 workers) accounted for nearly 50% of total employment and a larger proportion of output (Boston Consulting Group, 1991:7).

As is the case in assembly, the components industry is undergoing major structural changes and new forms of relationships between assemblers and component suppliers are developing with important implications for developing country producers.<sup>38</sup>

The American and European mass producers have traditionally dealt with between 1 000 and 2 500 suppliers whereas Japanese assemblers generally have less than 300 direct (first tier) suppliers even though they outsource a larger proportion of components. In the Japanese system, these first tier suppliers carry a far greater responsibility for the design and development of an entire sub-assembly such as the braking system, and in turn draw on a range of second and third tier suppliers for individual components. The relationship between Japanese assemblers and suppliers is far less adversarial with relationships being developed over a long period and component suppliers being closely involved in the development of new models from the initial stages. American and European firms are now rapidly adopting elements of this system with the number of direct suppliers being reduced and key firms being required to take greater responsibility for research and development.

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37. World Automotive Components, *Financial Times Survey*, 14 July, 1992.

38. See for example Lamming, 1988, 1990a, 1990b, 1993.

**Table: 1.7**

Rank	Company	Sales(\$bn)	Home Country
1	GM Automotive Comp.	29.0	US
2	Ford Automotive Comp.	13.5	US
3	Bosch	10.6	Germany
4	Nippon Denso	9.1	Japan
5	Dana	4.9	US
6	Philips	4.8	Netherlands
7	Valeo	3.9	France
8	Allied Signal Automotive	3.8	US
9	GM Hughes	3.5	US
10	Cummins Engine Co	3.5	US
11	Magneti Marelli	3.4	Italy
12	TRW Automotive	3.4	US
13	Acustar	3.4	US
14	ZF	3.1	Germany
15	BASF	3.1	Germany
16	Sumitomo Metal	3.0	Japan
17	ITT Automotive	2.9	US
18	Aisin Seiki	2.9	Japan
19	GKN	2.8	UK
20	Lucas	2.4	UK

Note: Turnover for European companies indicates European sales only

Source: Adapted from, World Automotive Components, *Financial Times Survey*, 14 July 1992

Changes are being forced through by competitive pressure on the assemblers who are in turn demanding price cuts and improved service from suppliers. Also, European and American suppliers are now competing directly with Japanese component producers who are establishing production facilities in the wake of transplant assemblers. One example is the highly publicised move by General Motors to shake up its supply network. General Motors is renegotiating supply contracts and demanding price cuts and quality improvements while offering the carrot of long term supply contracts. In-house purchasing will be reduced, global sourcing will be expanded and GM will in future seek to deal with fewer selected suppliers with whom it wishes to cooperate more closely.<sup>39</sup> Ford has already cut its number of world wide suppliers by over 50% since 1980.

39. World Automotive Components, *Financial Times Survey*, 14 July 1992.

These developments draw on the Japanese system with modifications according to the strengths of the local industry. Taken together they amount to a new *modus operandi*, what Lamming (1990) calls the 'post Japanese model' of component supply. According to Lamming the major elements of this evolving model are :

- fewer, larger component suppliers with greater technological capability.
- a supplier industry increasingly structured into tiers dependent on the capabilities of firms and the nature of their links to assemblers. First tier suppliers will supply whole sub-assemblies directly to assemblers and will have extensive R&D capabilities. They will in turn draw on second and third tier suppliers for more minor components.
- stronger and more cooperative vertical relationships between companies in the various tiers and between first tier suppliers and the assemblers.
- more developed horizontal relationships with an expansion in various forms of partnership such as joint ventures and technology and supply agreements.
- major suppliers will have to accompany assemblers to new locations.
- first tier suppliers rather than assemblers will increasingly undertake sourcing from low wage countries.
- attaining competitive advantage will require the adoption of best practice in terms of working practices and technology.

#### **4.1 Implications for developing country suppliers**

These changes have important implications for the location of production and especially for developing country suppliers seeking to break into the major markets. Certain factors are negative for far flung sources of supply and have led some analysts to argue that prospects for developing country component exports are gloomy as assemblers and component suppliers increasingly locate within their major (developed country) markets. There is no doubt that the increasing use of JIT supply does impose a constraint on prospective exporters because of their physical distance from the market. Major suppliers are following assemblers to new locations and establishing their own networks of subcomponent suppliers in reasonably close proximity.

However, a number of caveats can be raised. The logic of just-in-time does not necessarily require close physical proximity. The JIT system can in fact operate across continents, the main requirements being regular delivery and short lead times. Shaiken (1990) for instance, cites the example of CKD packs being imported into Mexico from Japan on a specially adapted JIT basis.

Component plants are in any event not usually established to serve a single assembly plant although they may have one principal customer. The more likely scenario is that a component plant will be set up in a location appropriate to serve a range of assemblers.

There are also indications that the extreme form of JIT, with delivery several times a day as in Japan, is itself coming under pressure as certain problems manifest themselves. One problem is the shortage of industrial land and labour in locations close to assembly plants. This is forcing suppliers to move further afield. In the context of the environmental and congestion problems of modern Japan, the system has serious negative externalities. As Nieuwenhuis (1992) has shown, the roads space used and emissions of dozens of light delivery vehicles far exceed those of a single heavy goods vehicle which could carry an equivalent load. Delays caused by congestion can mean that buffer stocks are required or that stocks end up being held in the most irrational form of all – in a goods vehicle on the highway!

Assemblers increasingly require that first tier suppliers will locate close to assembly plants especially if they are producing bulky components such as seats. However, a nearby physical location is much less necessary for second and third tier suppliers or for high value major components and sub assemblies.

While the advanced R&D capabilities which assemblers increasingly require from first tier suppliers rule out most indigenous developing country suppliers, there is still plenty of scope for major components such as engines to be produced in these countries although the bulk of design and development work will continue to be performed in advanced countries. There is also considerable scope for developing countries as second and third tier suppliers. If Lamming's model of the evolution of the component supply system is correct it may become important for the more advanced developing country suppliers to internationalise production. Second and third tier suppliers in developing countries will increasingly have to establish links with major component producers in the major markets rather than supplying assemblers directly as was the case in the past.

## **4.2 Trends in component production and trade**

Major locational shifts in the production of components are taking place. Component suppliers are becoming more internationalised, following assemblers to new locations and establishing networks of second and third tier suppliers within these locations. In the advanced countries, Japanese component firms are following the transplants first to North America and more recently to Europe, especially the United Kingdom.

Developing country component exports have, with some exceptions, been growing extremely rapidly (see Table 1.8) and account for over 10% of world exports of components. The top three developing country component exporters (Mexico, Brazil and Taiwan) accounted for only 1.6% of world component exports in 1980. By 1988 their share had risen to 3.8% of total world component exports which had themselves almost doubled over this period.

The US remains by far the largest importer of automotive parts and imports grew at a compounded annual rate of 4.1% from 1985–1989. Much of this increase was accounted for by Japanese imports which grew at a compounded annual rate of 14.7% over this period mainly to supply the growing production of Japanese transplants being established in the US. This rate of increase is likely to fall as Japanese suppliers locate in the US, but imports of automotive components have been growing even more rapidly from other East Asian suppliers as Figure 1.5 illustrates. Import growth rates from the Asian group have also outstripped that of imports from neighbouring locations in Canada and Mexico although the establishment of NAFTA will give the latter group an added advantage.

The use of imported components in the European industry has traditionally been at a lower level than for the US. But the German industry, in particular, is looking to increase international outsourcing. This is the case both among volume producers (VW) and speciality firms such as Mercedes and BMW. Mercedes, which has traditionally purchased 90% of its components from German companies, is planning to reduce this to 75%. According to industry estimates, the average foreign content of all cars produced in Germany has risen to 30% in 1993 from 25% in 1992.<sup>40</sup> The major reason cited is the high cost of labour in Germany.<sup>41</sup> Most of this growth in outsourcing will be in lower wage countries of the EC such as Spain and the UK and from Eastern Europe but imports from developing countries are also increasing.

Germany is already by far the most important foreign market for South African component suppliers and represents a major growth opportunity. An important factor has been the strong ties established through the three main German car producers all having assembly plants in South Africa.

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40. World Car Industry Survey, *Financial Times*, 9 September 1993.

41. Interviews with PJ Weber, Director of Subsidiary Companies, Volkswagen AG and E Papke, Manager-Corporate Planning, BMW (SA).

**Table 1.8****Component exports from developing countries, 1980–1988 (current US\$ millions)**

	1980	1985	1988	% Change 1980–1988
Argentina	63.3	62.9	67.2	6
Brazil	243.6	424.6	1500.0	516
Colombia	20.6	6.0	2.7	-86
Hong Kong	0.8	1.8	2.2	175
India	72.1	48.7	29.4	-59
Korea	20.5	93.0	181.0	783
Malaysia	2.7	3.7	5.7	111
Mexico	90.0 <sup>a</sup>	499.0	1970.0	2089
Morocco	7.4	10.0	15.9	115
Philippines	30.3	20.9	11.8	-61
Portugal	6.6	66.0	130.4	1876
Singapore	82.6	78.5	98.4	19
<b>South Africa</b>	<b>4.2</b>	<b>7.5</b>	<b>78.0<sup>b</sup></b>	<b>1757</b>
Taiwan	94.7	354.6	618.3	553
Thailand	9.3	11.4	21.3	129
Tunisia	0.3	4.4	19.1	6267
Turkey	43.0	65.5	71.6	67

a. Unofficial estimates

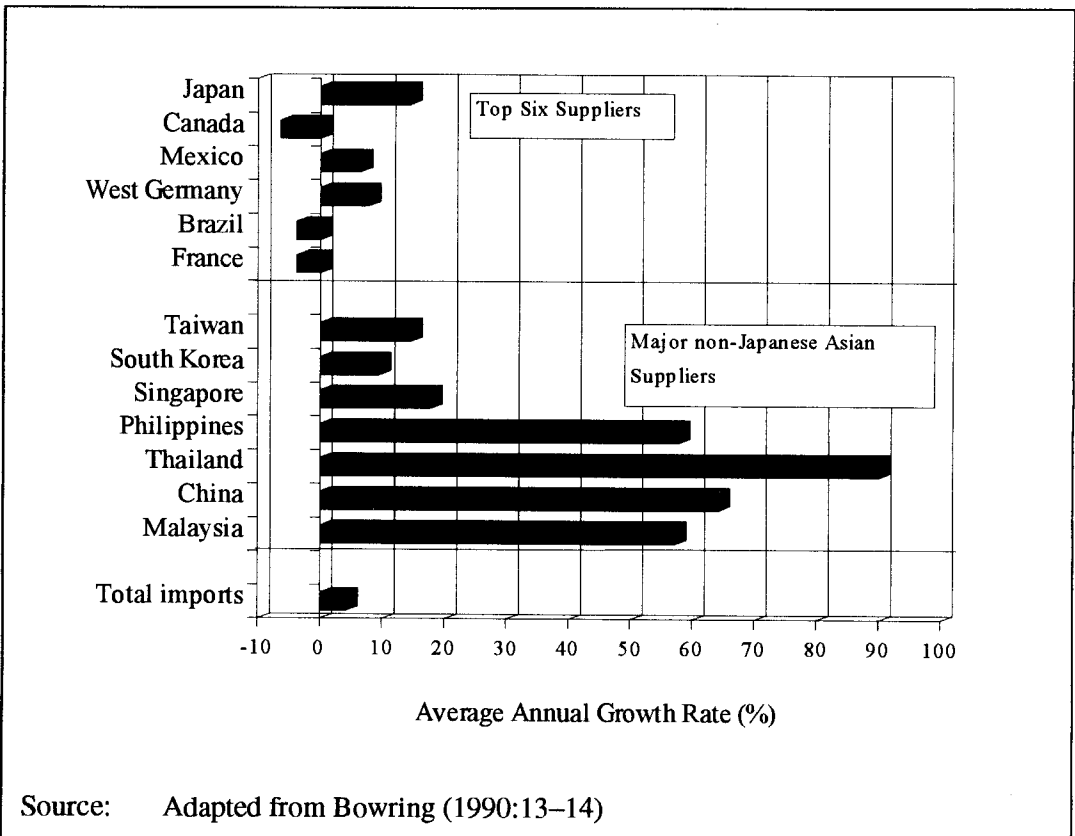
b. South Africa's component exports totalled nearly \$400 million in 1991.

Source: Karmokolias, 1990; Economist Intelligence Unit (1991a, 1991b), Bowring, 1990; NAACAM.

With the recent establishment of Nissan, Toyota and Honda assembly plants, the UK now has the fastest growing industry of all the major European producing countries. Component imports have been growing much faster than vehicle production and the fastest growing component exporters to the UK are developing countries with many exporting over long distances (Table 1.9). Many of these are Asian developing countries in spite of their long distance from the UK market. It would be speculative to predict future trends in component imports into the UK as the industry increasingly takes on the trappings of lean production, but there clearly exist opportunities for far flung developing country suppliers.



**Figure 1.5**  
**Rates of increase of US imports of automotive components**



Japan has historically relied less than any other country on component imports and in the early 1980s it imported negligible quantities of components (Hoffman and Kaplinsky, 1988:291). Imports have expanded mainly as a result of pressure from trade partners and also as Japanese plants established overseas export back to Japan. But imports from developing countries especially in Asia are also increasing. These have frequently resulted from foreign exchange balancing requirements in the new entrant countries but the strength of the yen over the past decade makes such arrangements increasingly attractive from an economic point of view. One important area of outsourcing from the Japanese industry is in the production of castings due to environmental problems and the reluctance of Japanese workers to perform foundry work. An indication of the difficulties of recruiting labour into Japan's automotive foundries is that the average age of the workforce is now 47.<sup>42</sup>

42. Interview with directors of Murray and Roberts Foundries, South Africa's largest producer of automotive castings. The managing director argued that foreign component producers "never had the opportunity of selling to Japan five years ago". This is no longer the case.

**Table 1.9****Imports of parts and accessories into the UK constant 1990 Sterling (million)**

	<b>Source Country</b>	<b>1990</b>	<b>1982</b>	<b>% Increase 1982-1990</b>
1	W. Germany	2 060.5	564.6	264
2	France	879.3	281.85	212
3	Belgium & Lux.	424.9	202.05	110
4	Japan	404.4	119.1	240
5	Spain	365.0	86.25	323
6	Italy	88.7	91.05	-3
7	Netherlands	207.8	55.5	274
8	USA	163.5	107.7	52
9	Sweden	120.4	46.05	162
10	Austria	72.6	8.4	764
11	Brazil	63.3	1.8	3417
12	S.Korea	57.1	3.3	1630
13	Portugal	41.0	3.45	1071
14	Denmark	39.4	23.1	71
15	Australia	33.1	10.65	201
16	Ireland	29.8	30.45	-2
17	Taiwan	17.8	7.95	124
18	Turkey	13.7	0.15	6750
19	Yugoslavia	12.2	4.2	190
20	Singapore	10.9	4.05	169
31	South Africa	6.0	1.1	445
<b>TOTAL (All Countries)</b>		<b>5434.9</b>	<b>1730.8</b>	<b>214</b>
<b>No. of vehicles produced (000)*</b>		<b>1565</b>	<b>1156</b>	<b>35</b>

Source: SMMT, 1991; 1993

It is therefore clear that while there are important forces pulling component suppliers and assemblers close to their major markets, developing countries are growing in significance not just as markets in their own right but as exporters of components to the major advanced country production centres. Developing country firms face substantial difficulties in achieving recognition with regard to quality and reliability let alone as first tier suppliers. Nevertheless, there are a range of routes into these markets depending on the capabilities of the particular developing country supplier.

- **Original Equipment**  
New entrants are unlikely to be able to target the original equipment market especially for major components. An easier entry route is as second or third tier suppliers. Increasingly, they will therefore be supplying first tier component suppliers rather than the assemblers themselves.
- **The Aftermarket**  
The aftermarket consists of replacement parts and accessories and offers a relatively easy point of entry for developing country suppliers because quality and delivery standards, while important, are less exacting than for OE supply. Also, volumes are generally considerably lower than for OE supply although the aftermarket as a whole is very large. The US aftermarket for replacement parts, chemicals, tyres, batteries and accessories was worth an estimated \$62.7bn in 1988, slightly higher than total international trade in components at that time. There is also the possibility of moving into OE supply after having established oneself as an aftermarket supplier. A number of South African firms have followed this route. One problem is that certain components are seldom replaced and therefore, by definition, do not have an aftermarket.
- **Niche Markets**  
There is a growing market for suppliers who are able to produce a wide variety of low volume components either for original equipment or the aftermarket. In the case of original equipment, this may refer to low volume or old models. The proliferation of models and frequent model changes has led to a major increase in the variety of parts required in both the OE and aftermarket. Margins in niche markets are generally better than in high volume OE supply. Domestic producers in the advanced countries prefer large volumes and a recent World Bank study of the US aftermarket (Bowring, 1990:42) indicated that this applies also to overseas suppliers. Many importers and manufacturers complained that developing country suppliers would not deal with them because orders were insufficient to make production feasible. The reason cited was that the production capabilities of many developing country suppliers were geared to high volume production. This represents a major opportunity for fragmented developing country industries such as South Africa which lack economies of scale but have developed significant capability in low volume production.

## **5. Conclusion**

Internationally the motor industry is experiencing a very difficult phase of recession and adjustment. Overcapacity, structural changes and major shifts in relative competitive advantage are now impacting on some of the most established production regions. Turmoil in the major producing countries is in turn impacting on developing country industries, many of which are reducing protection and seeking export expansion. Among developing countries, substantial inter-country differences in performance are apparent – in some there has been drastic decline, while others have enjoyed rapid expansion. It has been argued in this chapter that the prospects for middle income country industries are, on balance, reasonably favourable. The reasons are as follows:

- 
- their markets are generally growing far more rapidly than in the advanced countries.
  - the potential for export to the developed countries is substantial. The rapid diffusion of practices such as JIT require close physical proximity for certain types of component suppliers but there is also evidence of greater international outsourcing from major producing countries.
  - improved forms of production organisation originating in Japan are quite clearly transferable to developing countries. As a result middle income countries are able, in certain cases, to match the productivity of developed countries and their lower labour costs then give them a cost advantage.

Many middle income countries, including South Africa, currently face a window of opportunity in which it is possible for their domestic industries to take advantage of the structural changes that are occurring and to improve their global position. There will be winners and losers in this process. Certain middle income countries will emerge as major vehicle and component producers in the early years of the 21st century while others will face decline. In the following chapters we turn to a consideration of the South African industry and its growth potential.

## Chapter Two: The development of the South African industry

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### 1. Industry overview

The production of motor vehicles and parts accounted for 5.9% of South African manufacturing value added over the period 1988–1990, a significant decline from its 8.0% share during the high growth phase 1980–1982 (Table 2.1).

**Table 2.1**

**Percentage share in manufacturing. (Constant 1990 prices)**

	1972–1974	1980–1982	1988–1990
Demand	11,3	12,0	9,1
Imports	19,7	19,0	14,9
Exports	2,5	2,3	2,6
Production (Ex-factory sales)	9,5	10,3	7,7
Value added	7,7	8,0	5,9
Employment	5,2	6,0	5,6
Fixed capital stock (net)	4,2	2,9	3,5

Source: IDC (1992:2)

#### 1.1 The domestic market

The domestic market has traditionally been virtually the sole outlet for production and only in recent years have vehicle exports occasionally exceeded 5% of annual output. The South African market has been in a long term decline since the early 1980s (Figure 2.1). If the rapidly rising trend line that characterised the period from the late 1950s until the early 1980s had been maintained until now, annual 1992 car sales would have been approximately 350 000 units instead of the actual figure of only 182 000. Based on the current proportion of commercial vehicles in total sales this would have produced a substantial total domestic market of close to 550 000 vehicles.

Actual sales of commercial vehicles have also declined during the 1980s but to a slightly lesser extent than is the case for passenger cars. Sales of commercial vehicles which accounted for 36% of industry sales in 1992 were 66% of the 1981 record level while car sales fell to only 61% of the 1981 peak. As a result of declining sales, the average age of the vehicle park increased from 7.2 years in 1981 to 10.9 years in 1991.

A number of factors have led to the sharp decline in domestic demand. The most important is the state of the economy and declining real incomes. However, a number of additional factors have specifically impacted on sales of motor vehicles, especially cars.

**Figure 2.1**  
**Quarterly passenger car sales 1958–1992**



These include price increases above the inflation rate and the partial introduction of fringe benefits taxation which have combined to substantially raise hire purchase installment costs as a proportion of average monthly wages and salaries.

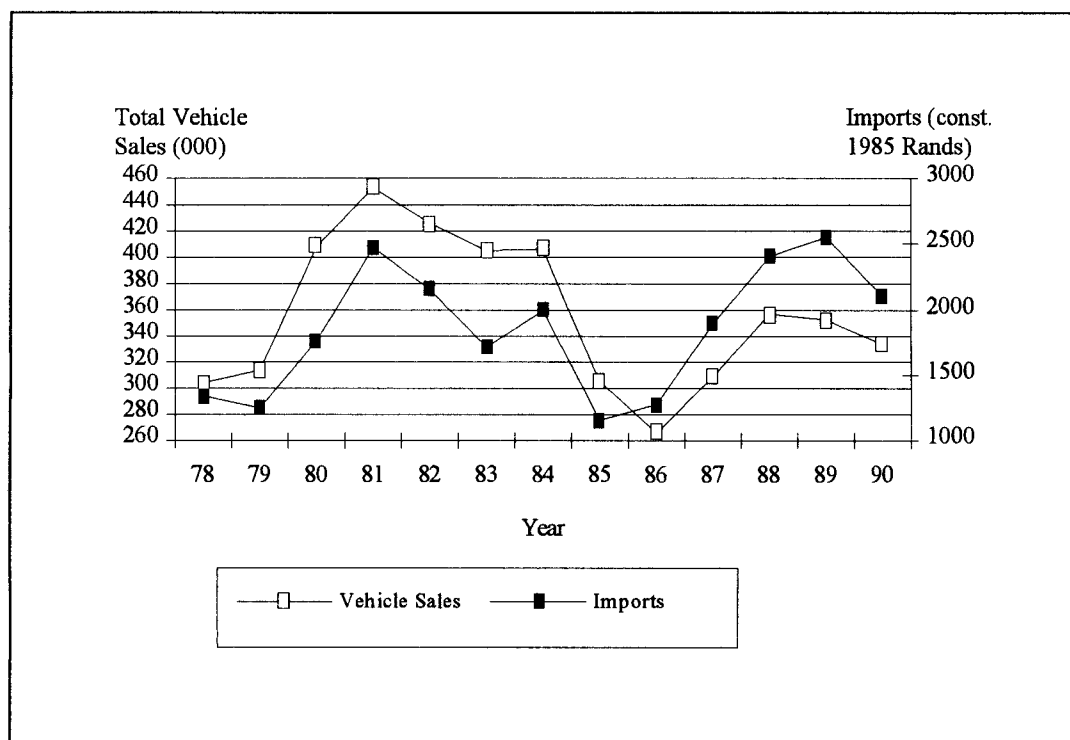
Measuring car prices is complicated by model changes over time but it is clear that they have increased ahead of the CPI. According to calculations by Econometrix, car price inflation outstripped the CPI by a significant margin from 1985 to 1992 (cited in Viljoen, 1993). A number of factors have played a role here. The depreciation of the rand against the mark and yen is one factor. Industry sources also cite rising labour costs, underutilisation of capacity, price collusion among assemblers and high investment costs. A further factor, subject to much dispute is the role of the Phase VI programme (see Section 2.2).

The result of rising prices and declining real incomes is that new cars have become increasingly unaffordable. According to figures produced by Toyota, new car prices rose from 65% of annual average white incomes in 1981 to 96.5% in 1991.

## 1.2 Exports and imports

Although exports have risen sharply, they still account for less than 10% of output. The sector remains highly import intensive with imports in 1991 amounting to R6.4 billion. Appendix 3 indicates the low local content position if profit margins and overheads are excluded. As Figure 2.2 indicates imports are strongly correlated with domestic sales.

**Figure 2.2**  
**Total vehicle sales and total automotive imports**



### 1.3 Structure of the industry

#### Assembly

There are seven assemblers producing passenger cars in South Africa. They all produce a wide range of passenger vehicles and most also produce commercial vehicles and trucks.

**Table 2.2**  
**Assembly firms operating in South Africa**

Assembler	Ownership	Makes	Passenger Vehicle Market share %
BMW SA	BMW AG	BMW	8.6
Delta	Local	Opel	9.4
Mercedes-Benz	Daimler Benz AG	Mercedes Honda	10.0
Nissan	Sankorp	Nissan Fiat	14.3
Samcor	Anglo American	Ford Mazda	15.6
Toyota	Local/JSE listed	Toyota	24.0
Volkswagen SA	Volkswagen AG	Volkswagen Audi	18.1

#### Components production

There are over 300 component producers in South Africa.<sup>1</sup> Nearly all of the larger firms and those engaged primarily in components production are affiliated to the National Association of Automotive Component and Allied Manufacturers (NAACAM) which has 155 members. The industry is however fairly concentrated with the 14 large firms/operating groups which employ over a 1000 workers accounting for nearly 50% of

1. This is according to a broad definition and includes those companies not primarily engaged in component manufacture.



total employment and a greater proportion of output.<sup>2</sup> More than 70% of these large firms are locally controlled.

## 1.4 Employment

Employment has been falling in all sectors of the industry, especially components (Table 2.3). Employment in the peak year of 1982 was 50 000 in assembly alone. Further retrenchment has taken place since 1991 with the component sector particularly hard hit. The moratorium on retrenchment negotiated by NUMSA for the assembly industry was able to limit retrenchment until it expired in 1992 and the assembly industry is threatened with major retrenchments such as the severe cuts recently proposed by Volkswagen.<sup>3</sup>

**Table 2.3**  
**Average monthly employment levels**

	1988	1989	1990	1991
Assembly Industry	35 301	37 434	37 845	36 895
Component Industry	65 000	74 000	69 000	65 000
Motor Trade	159 500	162 000	160 000	155 000
Source:	NAAMSA			

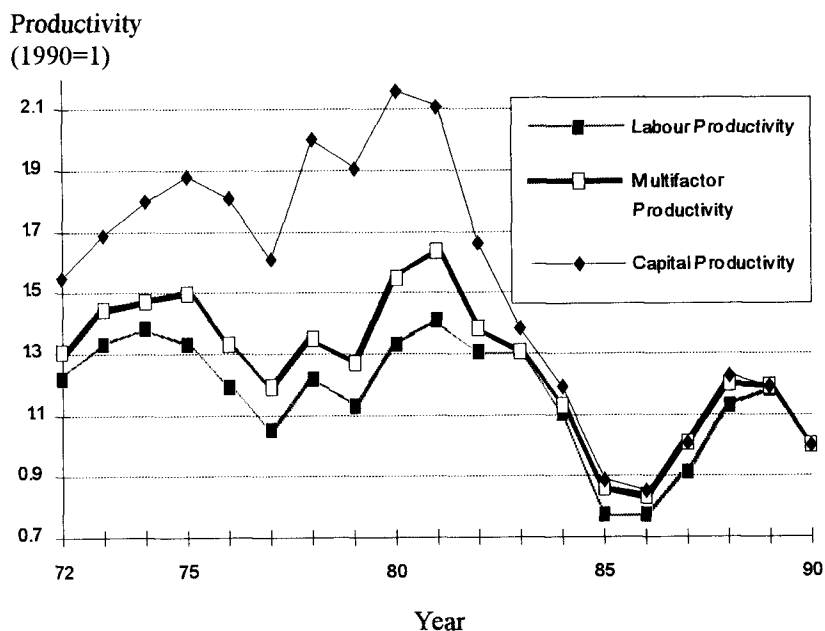
## 1.5 Wages and productivity

Productivity data in South African industry generally is of poor quality and subject to dispute. IDC data on the automotive industry (Figure 2.3) indicates a fall in productivity since the early 1980s resulting mainly from the sharp decline in the productivity of capital which is mainly the result of the underutilisation of capacity due to the decline in the market.

Data on unit costs in the assembly industry supplied by NAAMSA (Figure 2.4) also need to be treated with caution. An important reason for the decline in vehicles produced per employee is as a result of falling output levels from the relatively high base in the early 1980s. Nevertheless, they do point to high manning levels in the industry and the prospect of further retrenchments if output levels do not improve.

- 
2. This is at the level of the firm or operating group. Thus large groups such as T&N Holdings and its subsidiaries (Asseng, Ferodo, Silverton etc) are part of the same operating group. The level of concentration would be higher if control was taken up to the level of the final holding company (conglomerate/ financial institution).
  3. 'VW retrenchment plan', *Business Day*, 31 March 1993.

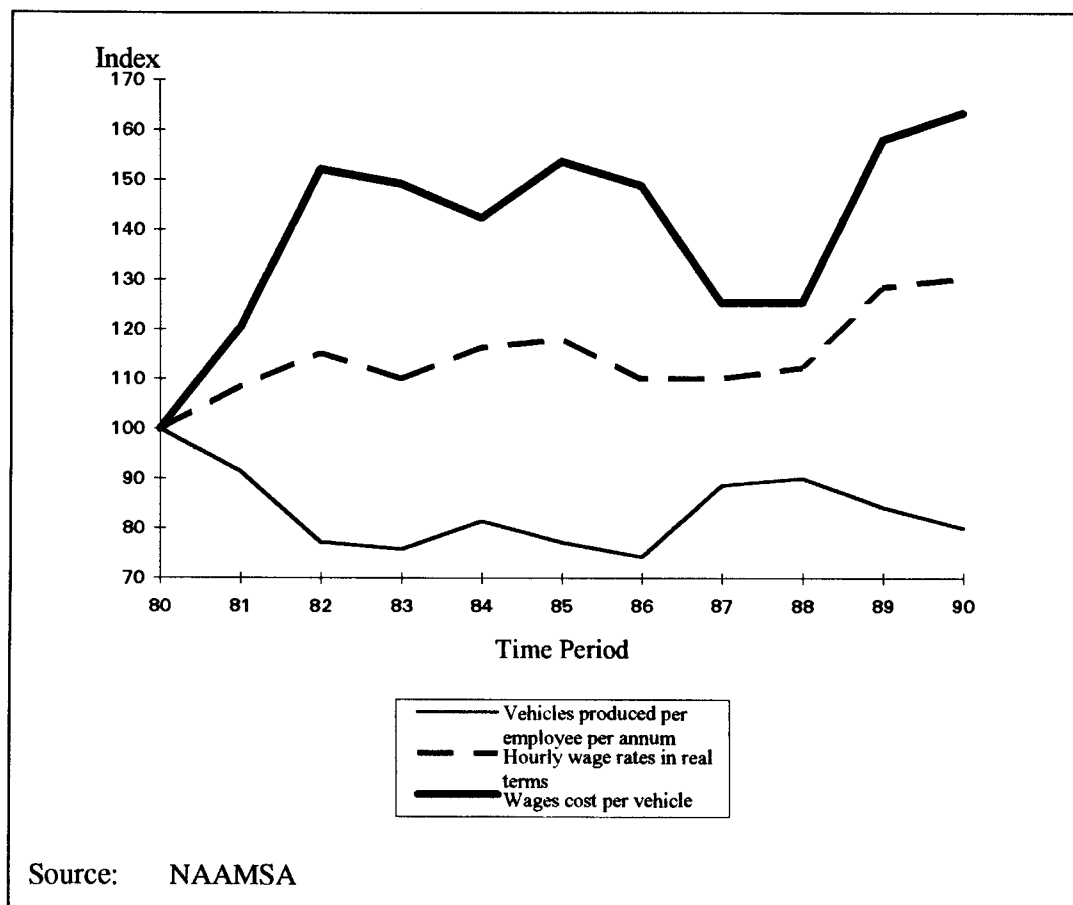
**Table 2.3**  
**Productivity: motor vehicles and components industry**



Source: IDC (1992)

As far as international competitiveness is concerned, the increase in dollar terms in hourly compensation costs for South African production workers has been one of the lowest of the producer countries listed in Appendix 1. While the rate of increase of South African hourly compensation costs have kept pace with those of the US, wages of all other countries in the sample have increased in relation to the US, with the exception of Brazil for which data is incomplete.

**Figure 2.4**  
**Wages and output per worker in assembly**



## 2. The development of the industry under protection

In order to understand the development of the South African automotive industry, it is necessary to examine the impact of protection and, in particular, the series of local content programmes that have been adopted. In most respects, South Africa followed a programme of import substitution similar to that adopted in other developing countries especially in Latin America. High tariffs were placed on CBUs, which when combined with a rapidly growing market, acted as a magnet to a large number of (initially foreign) companies which established assembly plants in the country. These operations, although in many cases highly profitable, were very small in international terms with correspondingly high unit costs. Production was aimed solely for the domestic market and the South African assembly plants were kept isolated from the global production networks of the parent companies except as markets for CKD packs.

Ford and General Motors were the first to establish a production presence in South Africa. They were granted protection and established assembly plants in Port Elizabeth in the 1920s. The domestic market expanded rapidly in the post-war period reaching 107 000 vehicles in 1958 and a large number of assembly plants were established. The level of local content at this stage was only 20%. The adverse impact on the balance of payments led to increasing government support for greater usage of domestically produced components. As a result, the first in a series of local content programmes was introduced in 1961. Domestic sourcing of eleven peripheral items such as tyres, batteries and trim was required and higher local content levels rewarded with additional import permits (Duncan, 1991). Although it was recognised that the desirable objective of increasing plant and model volumes could only be attained through rationalisation and a reduction in the number of assemblers, it was argued that this should be allowed to happen through normal market processes.

Net local content rose rapidly, reaching approximately 52% by mass by 1971 which marked the end of Phase II of the programme. Contrary to government expectations, rising local content requirements did nothing to reduce the number of assembly operations. Apart from the producers which currently have assembly operations in South Africa, companies such as Leyland, Peugeot, Renault, Citroen, Chrysler and Daihatsu were all assembling vehicles in South Africa by the late 1960s (Duncan, 1991). There were also no less than eight engine plants in operation together with more than 200 component firms, most of which were producing solely for the local market. Rapid growth was thus accompanied by the proliferation of assemblers and also by the development of a low volume components industry oriented towards the production of heavier components such as body pressings (due to local content being measured on a mass basis).

Under Phase III, local content (on a mass basis) was to reach 66 percent by 1977 in the case of 'manufactured' vehicles. Phase IV was a consolidation period with no additional requirements and Phase V, which was introduced in 1980, applied a local content requirement of 50% to light commercial vehicles rising to 66% in 1982.<sup>4</sup>

In all these developments, the main motivating factor for increasing local content remained the desire to save foreign exchange. A series of Board of Trade reports recognised the need to increase production volumes and the advantages of standardisation and frequently referred to the need for rationalisation. But at the same time it sought to maintain a choice of vehicles and therefore did not introduce very stringent local content requirements. There was a rather naive belief that market forces would bring about some rationalisation. Proponents of more interventionist policies to rationalise the industry by limiting the number of assemblers and pushing up local content to the 90% level did not prevail. Thus, high rates of protection were maintained on built up vehicles, no restrictions were placed on the number of assemblers entering the market and local content requirements were kept at fairly low levels.

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4. See Bell (1990) for an assessment of actual and potential local content levels in the South African industry.

## 2.1 Current protection measures

### The Phase VI program

The problems inherent in the above approach to the promotion of local content had become obvious during the recessionary years of the 1970s. The situation was aggravated by the severe slump which followed the gold boom of the early 1980s. This sharp decline accompanied by disinvestment pressures did lead to some rationalisation. The assembly of Alfa Romeos and Renaults ceased. Amcar (assembling Mazdas) and Ford merged to form Samcor and General Motors sold out to local management leading to the establishment of Delta Motor Corporation. Thus by late 1986, there were seven assemblers producing over 20 basic model variants for a market of 172 000 passenger cars. Even though this represented a considerable improvement on the situation in the 1970s when there were no less than 16 assemblers and 53 model lines (BTI, 1988:64), volumes were still very low and the industry remained uncompetitive. Exports were minimal (R105m in 1985) and with the increased introduction of highly sophisticated components, it had become increasingly easy to meet mass based local content requirements while increasing the value of imported componentry. Imports of vehicles and components amounted to R2059m during 1985, a year of weak demand.

According to the BTI, the local content programme up to and including Phase V had two main deficiencies. It led to:

"a tendency to produce low cost, low technology components which were unremunerative to export and were produced in uneconomic volumes so locking the industry into a low volume, high cost production structure; and

a very high import bill as source companies tended to load the price of components they supplied to local producers. As they were supplying largely high technology components which the local industry did not produce, this too tended to raise prices as there was no incentive to produce low mass, high cost components locally".<sup>5</sup>

The new Phase VI local content programme, introduced in 1989, was supposed to meet the following objectives (BTI, 1989):

- the promotion of investment, job creation and growth
- satisfaction of the country's essential transport requirements
- the improvement of productivity
- minimising price increases
- maintaining a high level of competition

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5. 'Phase VI local content programme for motor vehicles', Information Document, Department of Trade and Industry, 1992

Phase VI was a substantial change in direction. It marked the first attempt to seriously address the problems of an overly fragmented industry with low volume output and associated high unit costs. Local content was to be measured by value rather than mass. Most importantly, local content was to be measured not just by the value of domestically produced components fitted to locally assembled vehicles but on a net foreign exchange usage basis. In other words, exports by an assembler count as local content and enable it to reduce actual local content in domestically produced vehicles.

The system operates through the imposition of an excise duty of 37.5% on all locally assembled vehicles. However, this duty is rebatable to the extent of 50% of the local content value so that if the local content target (75%) is achieved, no duty is payable.<sup>6</sup> A minimum average level of 50% actual local content (ie. irrespective of exports) has to be maintained across the model range but local content is defined very broadly as the ex works price less forex used. It therefore includes profit margins and overheads.

Phase VI was intended to encourage both local content and specialisation. However, it was introduced rapidly and with insufficient consideration of its likely impact. As a result there have been a number of unintended outcomes and the programme has come in for fierce criticism. Many changes have been introduced adding to the atmosphere of uncertainty and in late 1992 the Motor Industry Task Group was appointed to re-examine the programme and the whole future development of the industry. The impact of Phase VI is discussed in section 2.2.

## **Tariff protection**

In addition to the protection provided by the local content programme, the industry also receives tariff protection on items which fall outside the ambit of Phase VI such as CBUs, spare parts and accessories. The duties which are applicable include customs duties (ad valorem, specific or formula duties) designed to protect domestic industry as well as an import surcharge which is applied mainly for fiscal purposes.

There is high degree of variability between different tariff lines although ad valorem duties on the whole are not very high with 88% of tariff lines having a duty of less than 30% (IDC, 1993). In addition import surcharges (usually 5%) are levied on imports. Ninety percent of the 295 tariff lines in the motor vehicle and related industries category receive a 5% import surcharge (IDC, 1993).

CBUs receive tariff protection of 100 percent and are subject to a 15% surcharge. As a result, imports of CBUs have been minimal.

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6. There was also a non-rebatable fiscal excise duty of 2.5% per vehicle.

## Comparison to protection in other sectors

The motor industry is likely to retain its own sectoral trade regime for the foreseeable future. Nevertheless, it is important that a gradual convergence of principles and protection levels with other sectors is achieved.

- **Complexity and fluidity**

A recent World Bank review (Belli et al, 1993) of South Africa's overall trade policy (excluding Phase VI) found it to be highly complex compared to nearly all other countries and subject to frequent change. Phase VI introduces an even greater level of complexity into the trade regime for vehicles and components. It has also been highly subject to change with numerous important amendments being introduced since it was first implemented in 1989. It is now being investigated by a full scale official enquiry which is certain to result in substantial changes.

- **The level of protection compared to other sectors**

The automotive industry produces both intermediate goods (components) and consumer goods (cars). Average nominal rates of protection for consumer goods in South Africa are close to 50%, much lower than for motor vehicles while average protection of intermediate goods is 15–20%. Comparisons of protection of the component industry with intermediate goods in general are complicated by the fact that the OE sector of the component industry is protected by local content requirements rather than a specific tariff.

In measuring comparable protection levels, it is also necessary to take into account the way in which prices are determined for foreign components. Imported components are mainly brought into the country in the form of CKD packs. If an OEM opts to use a local component this is removed from the CKD pack and an amount (called a deletion allowance) is subtracted from the cost of the pack by the foreign principal. Deletion allowances are widely held to be below competitive international prices. The result is that a domestic component manufacturer is competing not with 'competitive' international prices, but with a lower deletion allowance. It is clear that while the component industry was excessively protected compared to other intermediate goods sectors under Phase V this situation has now changed dramatically although precise comparisons cannot be made.

The real anomaly, however, is the prohibitive level of protection on CBUs. It is accepted on all sides that this should be reduced.<sup>7</sup> Nominal protection of 115% (100% ad valorem plus 15% surcharge) is unusually high even by the protectionist standards of developing country producers, although new entrants such as Thailand and Malaysia apply even higher tariffs.

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7. South Africa's current GATT offer is for a reduction to a nominal tariff of 50% for vehicles and 30% for components by the year 2003.

New entrant producers such as Mexico, Brazil, Taiwan and Korea have lower cost industries and lower levels of protection although both Korea and Taiwan still apply partial bans on Japanese imports.<sup>8</sup> The calculation of effective rates of protection on built up vehicles is complicated by local content arrangements but because of reduced protection on components, has increased sharply under Phase VI.

- **The neutrality of the trade regime**

South Africa's trade regime is biased against exports due to the higher cost of protected inputs and higher prices in the protected domestic market (Belli et al, 1993). This bias is compensated for by the GEIS export incentive so that the overall trade regime is on average reasonably neutral.

Exports under Phase VI receive a substantial effective subsidy in the form of a rebate of excise duty of 50 cents in the rand. All exports are channelled via OEMs and component exporters have to negotiate the extent of the subsidy that they receive. Component producers usually receive 60–70% of the rebate or 30–35 cents per rand of exports. However, there is pressure to reduce this as assemblers approach their required local content levels. This is a generally higher subsidy than would prevail under GEIS but the latter is tax free. Generally, the effective subsidy under Phase VI makes the overall trade regime for components reasonably neutral and may even bias it towards exports.

## **2.2 Developments since the implementation of Phase VI**

Phase VI constitutes a structural adjustment programme for the motor industry and has impacted on the industry in a number of areas producing big winners and losers. As a result it has been extremely controversial coming under fire from large sections of the component industry. Pressure from the component producer federation (NAACAM) played a role in persuading government to establish the Motor Industry Task Group.

### **Exports**

Exports have risen faster than expected and this is one area where most observers would agree that the programme has been successful, although factors besides Phase VI have also played an important role. The growth trend has been dramatic and exports have increased from negligible volumes in the mid-eighties to approximately R1.6bn in 1992 (Figure 2.5). While catalytic converters comprise an important part of this massive expansion, it is clear too that export growth is taking place in a wide variety of components.

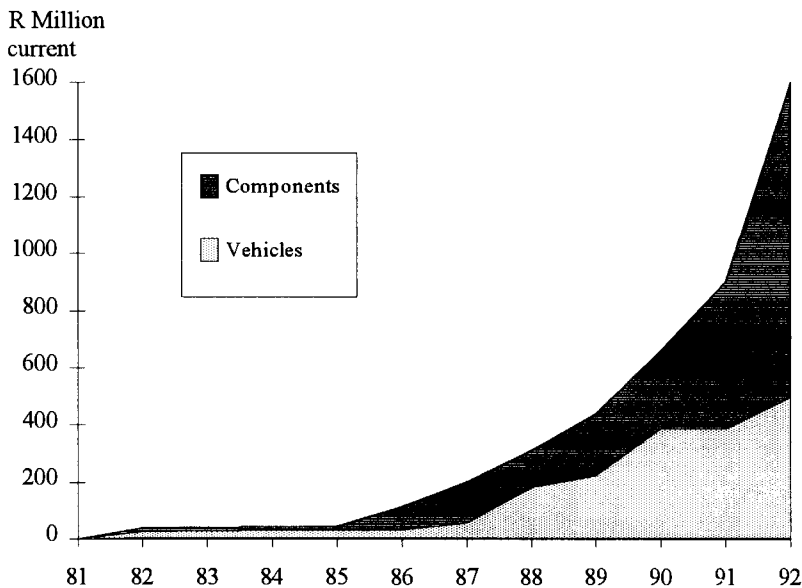
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8. It is important to note, however, that certain new entrants, most importantly Korea, maintained prohibitive levels of protection until their industry was well developed.



Under Phase VI all exports (including components produced by independent suppliers) are channelled through the assemblers. Many component suppliers and all the assemblers have instituted significant export drives. The assemblers have developed international marketing channels frequently via their overseas principals and identified the types of components where local producers have a competitive advantage.

**Figure 2.5**  
**The growth of automotive exports**



Notes: The major component exports are catalytic converters which accounted for approximately R400 million in 1992 and will rise sharply during 1993. Other major exports (in excess of R50m per annum) include body pressings, automotive glass, steel and alloy wheels, radiators, engine parts and automotive leather.

The data in this table are drawn from a number of sources (IDC, BTI, NAACAM and Customs. These various sources are not strictly comparable and the figures should therefore be treated with caution. Account also needs to be taken of fraudulent export claims (see Box 2.3).

In developing international networks and markets, the German based OEMs have the advantage of parent companies being keen to incorporate their South African subsidiaries into their global production system. BMW (SA)'s parent company in Munich has perhaps moved furthest to incorporate the South African plant as an integral part of a plan to internationalise production and component sourcing. For the locally owned companies such as Toyota and Nissan, this course of action is more problematic.

There is a much lesser incentive for the Japanese parent companies, which have no equity stake in the South African firms, to source from South Africa. Nevertheless, Toyota (South Africa) has renegotiated the terms of its licence agreement with Toyota Motor Co. and is now permitted to export CBUs to sub-Saharan Africa. Nissan has set up an export company, Motorware, with offices in Europe and the Far East. Its main exports have been in three areas:

- CBUs, mainly to sub-Saharan Africa but also to Taiwan
- Original equipment such as castings and catalytic converters mainly to Nissan and Fiat
- Components to the international aftermarket

Volkswagen (South Africa)'s exports have risen from R30m in 1989 which consisted mainly of used tooling, to approximately R500m<sup>9</sup> in 1992.<sup>10</sup> Roughly half of this latter figure was accounted for by left hand drive Jettas exported to China. The other major export produced in-house is press parts, exported to VW plants in Europe. Other high volume exports include steel wheels and catalytic converters. A more significant long term proposition is that VWAG is considering using South Africa as a production base for right hand drive Audis or right hand drive components for the world market.

For the components producers, foreign ownership or a joint venture arrangement with a foreign firm has conferred some advantages under this new scenario. Foreign owned firms have, in many cases, been quickly incorporated into the worldwide sourcing arrangements of the parent company. Most domestically owned firms are equally dependent on licence agreements with foreign principals but face the problem of restrictions on export in terms of these agreements.

Rapid expansion is likely to take place over the next few years. A survey of 17 component firms<sup>11</sup> conducted in the course of this study indicated that 16 were already involved in exporting and the remaining one was planning to move into export markets.

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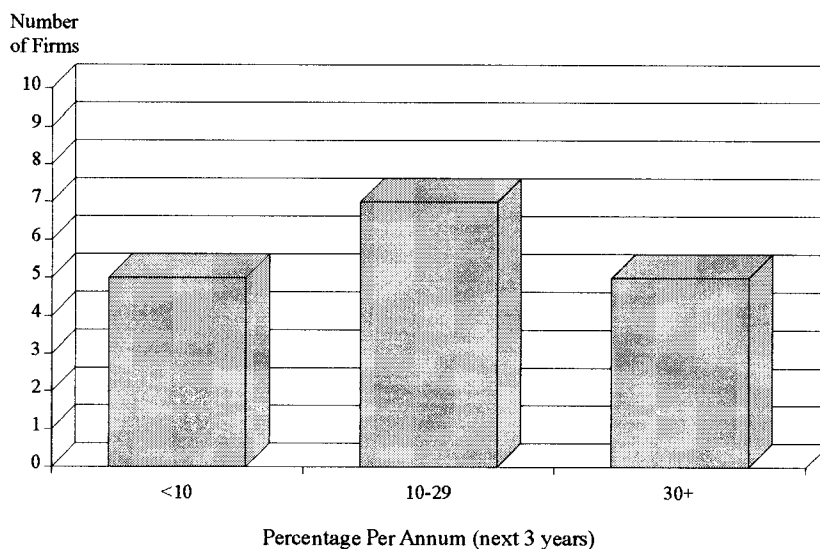
9. This includes exports of components produced by independent suppliers and channelled through VW.

10. Interview with D. Powell, Manager, New Business Development, VW(SA).

11. This was not a representative sample and was biased towards big firms but is nevertheless indicative of the rapid export expansion that is occurring. 103 of the 155 firms which are members of NAACAM claim to have some export activity.

All firms anticipated expansion in exports which were seen by many to be the only growth area (Figure 2.6). Twelve of the 17 firms surveyed expect rapid growth of export turnover (at least 10% p.a. in real terms) during the next 3 years while 29% of the firms expected exports to expand by at least 30% per annum in real terms.

**Figure 2.6**  
**Anticipated real export growth by component firms**



Source: Interviews

The important question is the extent to which export growth is sustainable and the extent to which it is a function of the current generous incentives and of recession in the domestic market? As far as component firms are concerned, the most important factors motivating exports have been the Phase VI incentives, recession in the domestic market and the desire to increase the scale of production and improve product quality as indicated by the survey results in Table 2.4.

It is difficult to gauge what would have happened to exports in the absence of Phase VI or what would happen if the incentives were withdrawn. It is clear, however, that they have been the most important factor promoting export expansion. The programme has led to some new investment and most firms do not expect this level of incentives to be maintained but are nevertheless planning export expansion. Some believe that they are competitive in certain export areas without incentives.

**Table 2.4**  
**Factors motivating exports**

Increased availability of incentives	32
To increase the scale of production	18
To improve product quality	17
Recession in the domestic market	12
Expansion, diversification or specialisation in the product line	10
A request from a client	8
Ending of sanctions	7
Depreciation of the rand	3
Other	5

Note: Firms were asked to rank the four major factors. The most important factor was allocated 4 points; the second most important 3 points, 3rd, 2 points, 4th, 1 point.

Source: Interviews

Most of the firms that are now exporting were not doing so ten years ago and the incentives have played an important role in getting firms to consider exports as a growth area and to establish marketing and distribution channels. OEM and to a lesser extent aftermarket supply requires large investments of effort in attaining the necessary quality certification. Firms fully understand that one cannot move in and out of such markets according to the fluctuations of the South African business cycle. While margins are generally lower in export markets, this is dependent on the type of product and high margins can be obtained in niche markets.

### **The impact on investment and component sourcing**

Rapidly rising exports have given assemblers considerably greater flexibility in their sourcing arrangements. By the end of Phase V, local content in terms of mass (which was the measurement used) had reached 66 percent but was lower in value terms. This measure of local content included only components and tooling. Actual local content need now only be a minimum of 50% averaged across the model range as long as the rest of the total 75% 'local content' requirement is made up through exports. Furthermore, actual local content is defined more broadly under Phase VI. It is clear, therefore, that with the growth in exports, OEMs have been able to drastically reduce the local content in domestically assembled vehicles.

**Box 2.1*****The catalytic converter controversy***

The biggest growth area in component exports has also been the most controversial. Catalytic converters are used to reduce exhaust emissions and are required equipment in most developed countries but are not yet used in South Africa. The converter consists of a stainless steel housing with a ceramic honeycomb core which is impregnated with a coating of platinum and rhodium. Since Phase VI was introduced, several catalytic converter plants have opened in South Africa, all with a tie up to an assembler. In 1992, they generated exports of approximately R400 million. The advantage for the OEMs is that they represent an easy way to achieve exports as the precious metal content makes the converter a high value product. Exporters receive a 50c/rand rebate on exports of catalytic converters, the platinum part of which (just under 50% of the value) would have been exported anyway. The plants that have been established are highly capital intensive but generally operating at a scale below that required to be truly internationally competitive without the rebate.

Traditional component producers are up in arms that large scale catalytic converter exports have allowed assemblers to increase foreign sourcing without undertaking exports of more traditional components. They want the converter exports to be classified under GEIS. So far government has taken action to limit inclusion of catalytic converters to 50–75% local content and the issue will undoubtedly feature in the deliberations of the Motor Industry Task Group. In response to these pressures, the industry formed its own Catalytic Converter Industry Interest Group in mid-1992.

Increased foreign sourcing was not the expected result of the programme. NAACAM initially welcomed Phase VI expecting a substantial increase in local content. Component producers received a large increase in requests for quotations but orders did not materialise. The Board of Trade also anticipated rapid growth in the component sector (BTI, 1989).

The short term impact of Phase VI was felt in three main areas:

- The switch from mass to value has had a highly differentiated effect on the components sector. OEMs began looking at ways of increasing local content by value rather than mass. Heavy components such as body pressings were no longer required and came under increasing pressure. Because of high tooling costs and short production runs, this was one of the most vulnerable sectors especially as it had enjoyed exceptionally high protection in terms of the mass based scheme. Pressing firms have been forced to rapidly restructure by specialising in fewer parts and establishing export markets in collaboration with original equipment manufacturers (OEMs). There has also been a limited shift into the increasing use of domestically produced high value components such as electronics. Bosch, for example, established a high tech plant to produce electronic control units.

- Components which formed part of sub-assemblies were also at risk because it became easier and cheaper to import these in a semi-assembled form thus simplifying assembly and limiting the problems of local re-engineering, quality and supply complexities (Viljoen, 1993:111).
- Components with high tooling costs especially in relation to the cost of the component were also vulnerable. Again, low volume production for the domestic market made these uneconomic. This was especially the case if the cost of the component was relatively cheap compared to the tooling such as in the case of plastic injection moulded components.

However, for models introduced under Phase V, manufacturers tended to maintain their sourcing arrangements due to sunk investment in tooling and contractual obligations. Also, it took time to build up large export volumes. Thus the increased flexibility to source additional components abroad is most apparent with new model introductions and started to have a major impact during 1992. In the case of VW, for example, the impact on imported content is set out in Table 2.5.

**Table 2.5**

**New model introductions and changes in import content at VW(SA)**

		Import Content %
<b>Phase V</b>	Citigolf	36
	Old Jetta	42
<b>Phase VI</b>	New Jetta	54
	Audi	82
Source: Interviews.		

Many new models especially of lower volume vehicles are being imported virtually in SKD form with local content limited to peripheral items. Recent model introductions such as the Nissan Maxima and the Toyota Camry have very little local content.

Where local components are still being used, margins have come under pressure. A survey conducted by NAACAM in the second quarter of 1992 revealed a significant drop in turnover of the components industry which they attribute to reduced local content as a result of new model introductions under Phase VI. Estimating the impact of Phase VI is complicated by the difficulties of disaggregating the impact of recession from reduced domestic sourcing. Also, reduced domestic sourcing has to some extent been compensated for by exports although much of this has been in 'non-traditional' components such as catalytic converters (see Box 2.1). There has, however, been a drastic fall in employment in the component industry of nearly 20 000 jobs between March 1989 (the introduction of Phase VI) and June 1992.

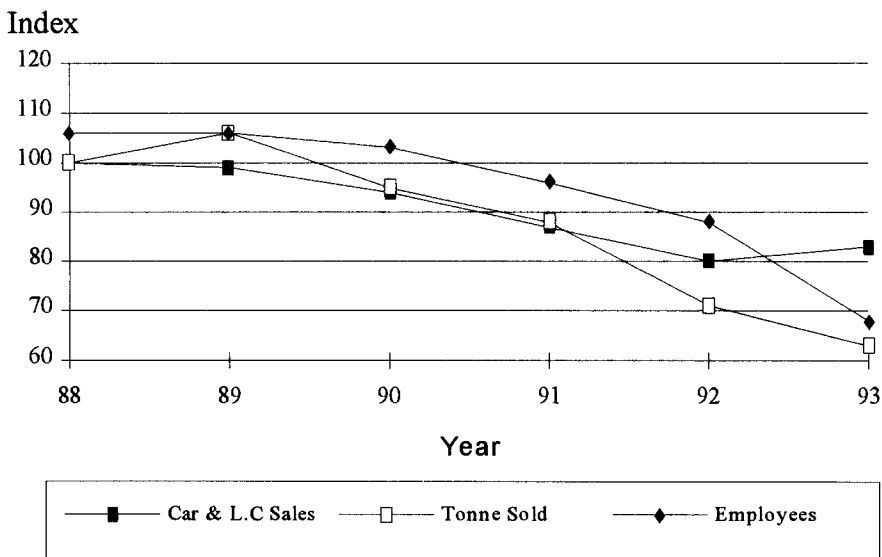
## Box 2.2

### *Automotive foundries – an industry under pressure*

Automotive castings such as engine parts and brake discs produced by the foundry industry are components which would appear to be particularly well suited to production in South Africa as they are intensive in the use of our more abundant resources. Scrap metal accounts for 10% of the sales price (more in the case of aluminium castings) and energy accounts for a further 8–11%. However, the industry faces serious difficulties in adapting to the sudden withdrawal of protection that has occurred under Phase VI. Producers of castings were major beneficiaries under previous weight based local content programmes and a large industry developed producing a wide range of components in low volumes with very limited exports. Under Phase VI, South Africa's engine producers can no longer compete and complete engines are being imported on a large scale duty free. Even efficient producers of engine components would find it difficult to compete against the low deletion allowances and the assemblers preference for importing fully assembled engines. Nearly all the assemblers with the exception of VW have increasingly switched to imported engines on at least some of their models.

Murray and Roberts Foundries is by far the largest producer of automotive castings in South Africa. Although it sees exports as its major growth area, they currently only account for 5% of output and the underutilisation of capacity adds further to costs. Figure 2.7 indicates the divergence between tonnage of castings sold and car and light commercial sales during the last two financial years as further inroads are made by imports.

**Figure 2.7**  
**M&R Foundries – output and employment in relation to vehicle sales**



## The impact on vehicle prices

South African car prices are well above international prices. Differentials vary and are generally higher in the luxury end of the market. According to a recent study submitted to the Motor Industry Task Group, cutting tariffs to the still high nominal level of 60% would make imports cheaper in eight models.<sup>12</sup>

### **Box 2.3**

#### ***Administrative capability and complex industrial policies***

South Africa has an extremely complicated trade policy and sector specific programmes such as Phase VI add further complexity. The more complex the policy the more difficult it is to administer and the greater the potential for abuse. A celebrated example is the fraud allegedly perpetrated by a firm called CET Trading which came to light early in 1992. CET exported nuts and bolts to companies within the same group in Europe. By massive overinvoicing it was able to claim sales of R551 million on goods worth around R150 million and thus claim rebates of R275.5 million (*Sunday Times*, 12 July, 1992). As is the case with all Phase VI component exports, these were channelled through one of the assemblers (in this case Toyota) which received part of the rebate. Toyota verified that the nuts and bolts were genuine automotive components but was unaware of the overinvoicing (*Finance Week*, 19–25 March 1992). This relatively simple stratagem, which could happen in any situation where exports are subsidised, points to the importance of a high level of competence in the institutions responsible for implementing and monitoring sophisticated industrial policies.

Furthermore, prices have been rising at a higher rate than the CPI at least until 1993. Phase VI has been widely blamed in the media and by industry analysts as being a contributing factor. As one of the objectives of the programme was to reduce costs this claim needs to be investigated.

As has been explained above, the growth in exports has greatly increased the flexibility of component sourcing allowing assemblers to take advantage of cheaper foreign components. This has led to a substantial reduction in costs, especially as new models are introduced. Component suppliers which were used to prices being determined on a 'cost plus' basis are being forced to become more efficient and reduce their margins as they face ultimatums to reduce prices in real terms or have the particular component placed back in the CKD pack.

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12. 'Import duty cut could put 8 SA cars off road', *Sunday Times* 14 March, 1993.



The complaints about price increases resulting from Phase VI relate to the incentive structure, specifically the fact that 'local content' includes profit margins. Thus if one assumes that a vehicle with an ex works price of R100 000 uses forex of R40 000, this gives a 'local content' level of 60%. Raising the vehicle's ex works price from R100 000 to R120 000 therefore increases local content to 66% allowing the manufacturer to claim a higher rebate. Thus a new element is introduced into the assembler's determination of the wholesale price. In a normal competitive situation, the assembler would have to weigh up the benefits of a larger price increase against the negative impact on demand and market share. This method of calculating local content clearly increases the benefit side of the equation.

### **Proliferation of makes and models**

One of the problems of previous programmes was uneconomic volumes and the resulting high cost production structure. The support for exports combined with sharply reduced protection for imported components meant that this problem was partially addressed for the assembly sector. However, a major defect of the programme is that it did not address the major factor impacting on the scale of production in the components sector – proliferation of makes and models in the domestic market. In fact, the impact was rather the reverse. By increasing the flexibility of component sourcing (and hence reducing protection on components) but at the same time maintaining high nominal protection levels on CBUs, the effective rate of protection on CBUs has increased sharply under Phase VI. The predictable result has been an increase in the variety of models and makes being assembled locally in spite of the stagnant market (Table 2.6).

Exports of CBUs could lead to greater specialisation and higher volumes but these have so far been minimal and motivated by the incentive and underutilised capacity rather than a drive to specialise in the production of one or two models for the world market. Some companies are considering specialisation but this will require substantial amendments to Phase VI.

The major problem resulting from this is that component producers face increased import competition but their baseload in the domestic market has become increasingly varied. Thus low volume, high variety domestic component producers are being pitted against high volume, low variety international producers. Some can deal with this problem through niche market or high volume exports but as chapter three demonstrates, there are many component suppliers who face serious constraints in embarking on such a strategy.

**Table 2.6**  
**Proliferation under various phases of the local content programme**

<b>Phase</b>	<b>No. of assemblers</b>	<b>No. of models</b>
Phase I (1960)	8	24
Phase II (1970)	16	43
Phase III (1976)	13	39
Phase V (1987)	7	20
Phase VI (1993)	7	34

\* Although the number of assemblers remained at the 1987 level, a number of new makes have been introduced since the advent of phase VI. Nissan has started assembling Fiat Unos and VW has begun assembly of the Audi.

Source: Boxall (1989); Industry sales data

### 3. Conclusion

The series of local content programmes introduced in South Africa have been seriously flawed. They are directly responsible for the development of a fragmented and non-competitive industry. Phase VI was an attempt to address this situation. It has encouraged exports but at the same time drastically reduced protection of the components sector while doing nothing to reduce the proliferation of models being assembled domestically, which is one of the major reasons for the component sector being uncompetitive. A further problem is that Phase VI was introduced at a time of great political and economic uncertainty and a generalised lack of investor confidence. This has provided an inappropriate environment for a programme of structural adjustment, the success of which is always crucially dependent on a positive supply response.

# **Chapter Three: Competitiveness in the South African automotive industry**

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In 1984 MIT's International Motor Vehicle Programme published its first influential book on the future of the automobile. It had little to say on the South African industry and was negative on future prospects:

Two countries outside the major auto-producing regions have had substantial auto industries for 30 years, fostered by a long history of government efforts to promote local manufacture. However neither Australia nor South Africa has developed an export industry, and it is difficult to see any competitive superiority developing in these locales which share the disadvantages of relatively high wages rates, small domestic markets, long shipping distances to major markets and low labor productivity compared with Japan (Altshuler et al, 1984).

This rather gloomy perspective on future prospects has a fair degree of acceptance among many of the players (companies, unions and relevant government agencies) in the South African industry who for quite understandable reasons find it difficult to envision rapid expansion in the near or medium term. It is widely agreed that the South African automotive industry is uncompetitive both in terms of components production and in assembly. South African cars are priced well above world market levels and receive 100% nominal protection from CBU imports. The components sector also receives a high but declining level of protection via local content regulations. Exports are rising rapidly but are highly subsidised.

But how uncompetitive is the industry and for what reasons? More importantly, are there areas of actual or potential competitive advantage? This chapter examines actual and potential competitiveness in the South African automotive industry. One central argument is that while the industry is currently uncompetitive in many areas, there are significant areas of strength as well as considerable scope to gain competitive advantage in other product lines.

One important measure of competitiveness would be to conduct an international benchmarking exercise which could rate South African manufacturing capabilities in terms of best practice according to criteria such as direct labour hours per unit of output, quality, lead times etc. Such an exercise is beyond the scope of this study but we have reported on an initial attempt to compare assembly plant productivity in South Africa with the results of the assembly plant survey undertaken during the course of MIT's International Motor Vehicle Program.

The focus in this report has been on a micro-level study at the level of the firm in an effort to assess how firms are responding to greater international competition in domestic and foreign markets. This chapter examines technological capabilities, the cost disadvantages that South African firms face in terms of input costs and the cost raising impact of low

volume production. It also provides some impressionistic evidence of how South Africa rates in terms of emerging best practice in assembly and component manufacture commonly now termed lean production. Chapter Four goes on to provide a set of complementary case studies of how firms are responding to greater international integration.

## 1. Technology transfer

The South African automotive industry is highly dependent on foreign product and process technology. All vehicles are produced either by foreign firms or under licence with local design content confined to minor adaptations of locally specified components. The predominate form of technology transfer is through foreign investment (either wholly owned or on a joint venture basis) or through licencing. Producing under licence carries certain costs in terms of royalty payments and restrictions on exports. The latter is a serious problem in the South African automotive industry especially as firms seek to move into export markets under the pressures of the Phase VI programme.

Table 3.1 indicates the results of the component firm survey regarding technology transfer in component firms. While the sample is small and not fully representative, it is indicative of a number of important features. Firstly, component firms are heavily dependent on foreign licences as a source of technology. Only three of the sixteen firms possessed their own proprietary technology. Six out of 16 firms were constrained in export markets by the terms of their licence agreements and four felt themselves seriously constrained. The four highly constrained firms all produce sophisticated major components and therefore have no prospect of developing their own proprietary technology. All these firms were locally owned and thus face the additional problem of having little prospect of being drawn into the international sourcing networks of a foreign parent. Indeed, one firm immediately lost its foreign markets when the parent company disinvested as a result of political pressures. Foreign owned firms are for obvious reasons much less likely to be constrained in export markets and many have been integrated into the global network of the parent company.

**Table 3.1**

**Degree of export constraint imposed by foreign licensors on domestic component firms**

Degree of export constraint	Foreign owned firms	Locally owned firms	Total
Highly constrained	0	4	4
Slightly constrained	1	1	2
Not constrained	4	3	7
Own Technology	0	3	3

Source: Interviews

If firms are to export they have to either renegotiate licence agreements or develop their own proprietary technology. However, one problem is that many licence agreements were entered into when exports were not an issue. Firms now face the prospect of trying to renegotiate these. One clutch manufacturer had only been able to renegotiate one out of nine licence agreements and that after two years of acrimonious negotiation. An important issue for policy raised by these problems is that of government supervision of licences and stricter control over limiting clauses.

Developing their own technology is difficult for most component firms. In many cases, one is dealing with highly sophisticated components developed by the multinational principal which is spending tens of millions per year on R&D. This is not to say that South African component firms have no technological capacity although spending is limited. Among firms surveyed, the average of R&D spending was rather low at 3% of sales, with the dispersion ranging from negligible amounts to 8%.

Firms were asked to rate their own technological capabilities on a scale ranging from very limited capacity (the ability to choose among alternative technologies) to the capacity to generate new products and processes (Table 3.2).

**Table 3.2**  
**Component firm technological capabilities**

<b>Firm capability</b>	<b>Responses</b>
Choose among alternative technologies	0
Utilise to designed standards	0.5
Extend beyond designed capability	1.0
Adapt technologies	5.5
Generate new products and processes	4.0

Note: Some firms fell across two categories which accounts for the half scores.

Source: Interviews

Although firms spend relatively little on R&D and are generally highly dependent on foreign licences they are by no means totally lacking in technological capability. Most of the larger firms are able to adapt both product and process technology and even generate new products and processes. For the most part these are minor adaptations but in themselves are important in two ways. On the product side they illustrate the capacity for design even if only in a limited form. On the process side, the findings illustrate that firms are not only able to fully master the technologies they are working with but also to upgrade them by introducing adaptations. Experience in the NICs has indicated that incremental adaptations on the shop floor have been one of the major sources of productivity growth.

A significant number of firms were also able to generate new products and processes. All these firms were locally owned (2 were independent) and most devoted significant resources to R&D. Most were specialised in terms of their product and they were generally much more oriented to exports than the sample average. Two were involved in the production of wheels and had developed their own designs and brand names. While quality is extremely important, the manufacture of wheels is not as technologically sophisticated as, for example, gearbox assemblies and it is obviously a much easier industry to operate in without making use of licenced technology. Clearly this kind of opportunity is not open to South African producers of more sophisticated components.

Some firms have been able to introduce innovations which are ahead of western competitors. One aluminium wheel producer, for instance, has introduced modifications to the die cooling system which reduced casting time to 180 seconds compared to 300 seconds in Europe.

A number of firms are engaged in attempting to make machinery more flexible (see also Gabriel case study in Chapter Four) and new equipment is chosen with this in mind. Some important innovations resulted from the experience of high variety, low volume production which characterises the South African components industry.

So although firms for the most part are dependent on foreign licensors for new technology and spend little on R&D, there is a basic level of technological competence and clear capacity to introduce productivity raising technological adaptations. Furthermore, in some limited areas component producers are relatively advanced.

## **2. Competitiveness in the assembly industry**

Built up vehicles are highly protected and South African new vehicle prices are well above world market prices, especially for luxury models. Nevertheless, CBU exports have risen sharply to a wide range of countries. Most of the multinational carmakers who are involved in South Africa view the country as the major source of supply to the Southern African region in the future. South Africa is relatively more competitive in Southern Africa not only due to its locational advantage but because South African vehicles are adapted to African conditions – higher specification radiators and trim to cope with high temperatures and strong sunlight, stronger suspension and superior dust proofing. Also, spare parts can more easily be supplied from South Africa. There have also been a series of large contracts such as rebadged Mazda vehicles to the UK and VW's much publicized exports to China. This latter contract, although significant in value terms, should not be seen as being indicative of South Africa being competitive. It took place primarily because VW(SA) has spare capacity in the old models and, of course, was assisted by the incentives.

The major factors resulting in a lack of competitiveness in assembly are set out below.

## 2.1 The cost of components

Materials account for 70–80% of full manufacturing cost and competitive component supply is therefore critical to being competitive in vehicle production. Most components can be purchased more cheaply from foreign suppliers although price differentials vary widely according to the type of component.

One manufacturer estimates locally produced components to be on average some 30% above world market prices (see Table 3.3). At the same time it should be noted that South African suppliers are competitive in a wide range of components (see section 3.4).

**Table 3.3**  
**Local and imported component prices**

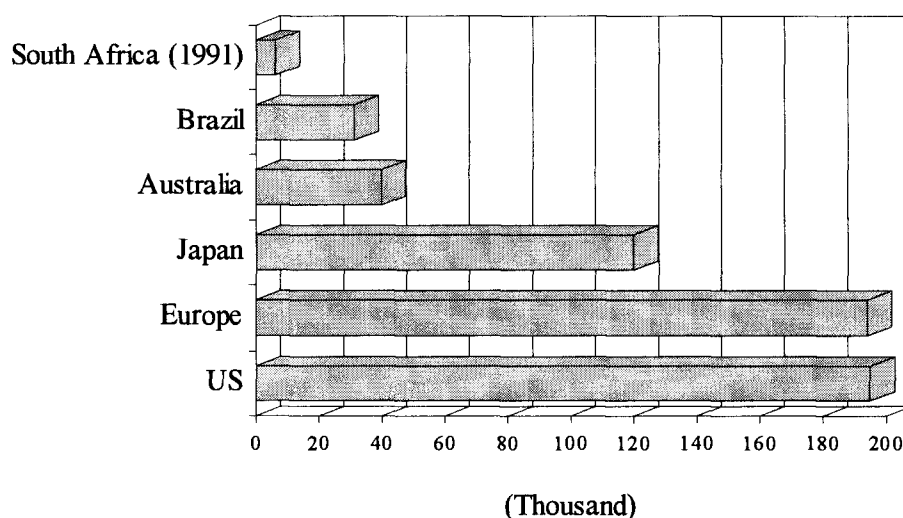
<b>Description</b>	<b>Cost of Imported Component as a % of Domestically Produced Component</b>
<b>Mercedes Benz/ Honda</b>	
Flywheel Component	66
Engine Harness	70
Manual Aerial Kit	31
Suspension Assembly	74
Front Axle Strut	55
Wheel Hub	70
Tyre 195/65R15H	71
Brake Caliper	80
Brake Disc (Rear)	51
Exhaust (Rear)	96
<b>Volkswagen</b>	
Doorlock	65
Starter Motor	78
Pressing – cross carrier	68
Rear Drum Brake Caliper	90
<b>BMW</b>	
Tyres	85
Windscreen	82
Fuel Tank	89
Note: Import prices are landed prices.	
Source: Interviews	

## 2.2 Economies of scale in assembly

Minimum efficient scale in assembly is briefly discussed in Chapter One, section 3.4. It is clear that South Africa's motor industry suffers from an extreme degree of proliferation according to any measure. There are seven passenger vehicle manufacturers in South Africa producing no less than 11 different makes with over 30 different basic models.<sup>1</sup> Production in 1991 (domestic sales plus export) was approximately 198 000 units so that average production per model was approximately 6000. As Figure 3.1 indicates this is exceptionally low in international terms. The proliferation of makes and models raises costs in assembly both directly, and indirectly through its impact on component production costs. This latter issue is dealt with in section 3.2.

**Figure 3.1**

**Average annual production per model by regional producers (passenger vehicles, 1990)**



Source: Womack et al, 1990; Automotive Industry Authority, 1992, NAAMSA.

1. The number depends on definition. I have defined basic models as being for example the Toyota Corolla and Cressida or the BMW 3 Series and 5 Series. Each of these models has a number of different derivatives (engine size, number of doors etc.)



Table 3.4 provides more detailed information on model proliferation by comparing South Africa with Australia which has had some success in reducing excessive model proliferation but is still a low volume, multiple model producer. Even by Australian standards, it is clear that the level of proliferation in South Africa is exceptional.

**Table 3.4**  
**Model proliferation — South Africa vs Australia**

<b>Annual Sales Volumes</b>	<b>No. of Models S.A.1991</b>	<b>Aust.1987</b>	<b>Aust.1991</b>
0–19 999	24	6	1
20 000–39 999	1	5	4
40 000+	1	2	3

Source: AIA (1992), NAAMSA

## 2.3 Low capacity utilisation

Another reason for high manufacturing costs in South Africa is low capacity utilisation. VW has capacity for 70 000 vehicles per year in one shift and 120–130 000 in two shifts. In 1992 it produced 50 000 vehicles. BMW, which is currently the most profitable of the South African manufacturers has capacity for 125 vehicles per day but in late 1992 was producing only 75. These kinds of figures are to be found at all South African assembly plants. This has been an additional factor which has pushed up prices of new cars during the recession.

## 2.4 The organisation of production

Most studies of shifts in competitiveness in the international auto industry cite production organisation as the cutting edge of competitive advantage. Thus 'lean production' (defined broadly to include not only production but also linkages to suppliers as well as the distribution system) is widely seen to be the primary reason for the rapid expansion of the Japanese industry as well as the success of Japanese transplants in the US and UK. This perspective has received its most influential support in the outcome of MIT's International Motor Vehicle Program (IMVP), 'The Machine that changed the World'.<sup>2</sup> All the world's leading automakers and suppliers are being forced to respond to these developments.

While I believe this view to be generally correct, if overstated in some accounts, it does not necessarily follow that the lack of competitiveness of the South African automotive industry can be primarily accounted for by the fact that it has not yet adopted lean

2. There are, however, no shortage of critics of this perspective. See, for example, (Williams et al, 1992).

production practices. It has been argued above that the lack of competitiveness in the South African industry is primarily a more mundane story about the way protection was applied and low levels of inefficient investment. This remains the central structural problem but equally the adoption of lean production methods will greatly facilitate the overall restructuring process by upgrading plant level productivity and encouraging new investment.

In this section, we present some limited and preliminary evidence as to how the South African industry stands with regard to lean production and the major constraints that it faces in this regard. Table 3.5 presents a preliminary attempt to compare South African assembly firms to a series of lean manufacturing benchmarks for producers in countries which were part of the IMVP study. While this data is preliminary and should be treated with caution, the basic findings have been generally supported by my own interviews.

For the most part, South African management are fully aware of lean production, of its implications and of its potential. Many have seen it in action in Japan. Awareness does of course not mean commitment to its full implementation and most attempts to implement lean production have sought to introduce aspects of the system in an unintegrated and partial manner. As a result they have frequently been opposed or disregarded by workers.

According to the benchmarking criteria used to measure plant level productivity, and the diffusion of lean production, South Africa shows up badly. South African assembly plants are unproductive in international terms. Low assembly plant productivity can be accounted for by relatively low levels of automation and training, the underutilisation of capacity and consequent overmanning as well as low plant volumes. The organisation of production also plays a major role with improvements hindered by adversarial relations on the shop floor.

## Quality

South Africa rates badly in terms of quality according to the comparative data in Table 3.5. On the other hand this is an area which is experiencing rapid improvement. Many firms emphasised the importance of quality if success was to be achieved in foreign markets and there were many examples of rapid quality improvement among both assemblers and component firms. For example, BMW which is a firm more oriented to export than most others, reports significant improvements to a level which is approaching that achieved by the parent company.<sup>3</sup>

Each type of defect is given a score (average 0.12) and both the parent company and the South African operation aim for a level not higher than 0.6 defects per vehicle. The parent company has attained a level of 0.8 while South Africa has achieved a level of approximately 1.2 a dramatic improvement from the level of 3–4 which prevailed 5 years ago. Nissan argue that a major improvement in quality achieved by effective shop floor

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3. Interview with Mike Parker, production manager, BMW(SA).

management is the major factor which has enabled them to dramatically improve passenger vehicle market share from the low of 6% in 1983 to 14% in 1992.

The size of the repair or rework area indicates the approach to maintaining quality standards. The main Japanese innovation here has been the integration of quality control into the responsibilities of line workers thus limiting the need for expensive final checking and repair. This is indicated by very small repair areas compared to South African (and European) plants (Table 3.5).

**Table 3.5**  
**Assembly plant characteristics**

	<b>Japan</b>	<b>All Europe</b>	<b>NIC</b>	<b>South Africa</b>
<b>Performance:</b>				
Productivity (hrs/vehicle)	16.8	36.2	41	50
Quality (Assembly defects /100 vehicles)	60.0	97.0	72.3	194
<b>Layout:</b>				
Size of Repair Area (% of assembly area)	4.1	14.4		15.1
Inventory Days (8 sample parts)	0.2	2.0		11.6
<b>Automation:</b>				
(% of direct steps)				
Welding	86.2	76.6		
Painting	54.6	38.2		
Assembly	1.7	3.1		
<b>Work Force:</b>				
% Work Force in Teams	69.3	0.6		2.5
Job Rotation (0=none, 4=frequent)	3.0	1.9		1.5
Suggestions/Employee	61.6	0.4		0.09
Number of Job Classes	11.9	14.8		32.0
Training of New Production Workers (hours)	380.3	173.3		50.5
<p>Note: The South African data are based on a sample of 3 manufacturers and should be seen as preliminary. The South African quality data are based on manufacturer's own measurements rather than customer surveys in the case of Japan and Europe.</p>				
<p>Source: Faull and van der Riet (consultants), Womack et al, 1990</p>				

### **Inventory levels and just-in-time (JIT)**

The just-in-time system is not well developed in South Africa as indicated by high inventory levels in Table 3.5. Many component firms report that JIT is used by assemblers to get component producers to carry the cost of holding stock and that they have had to establish warehousing operations to deal with this.

The benefits in terms of reduced inventory levels in the system are thus minimal and this may indicate that the inventory levels are effectively even higher than Table 3.5 indicates.

Toyota is the leader in the implementation of JIT in South Africa and has made an effort to reduce stock levels not only in its own warehouses but in those of its suppliers. It has also encouraged certain key suppliers to locate close to its Durban plant. Other manufacturers operate JIT systems with certain key components. For example, BMW and Nissan, both located in Rosslyn, near Pretoria draw on body parts and seats produced nearby by companies with which they either have close links or own.

However, there are a number of serious drawbacks and constraints to the fuller implementation of the JIT system in South Africa:

- High quality and reliable suppliers are vital to a proper JIT system and this represents the most important constraint in South Africa. Assemblers complain about the reliability of suppliers both in terms of delivery and to a lesser extent, in terms of quality. Thus the desire to eliminate buffer stocks is limited by the perceived high risk of work stoppages as well as the competence of suppliers. This is a problem not only for assemblers but also for component producers who cite problems with the supply of subcomponents and raw materials such as steel.
- Assembler firm capacity to manage the high level of coordination required in a JIT system is lacking in many cases.
- The high variability of production in the components sector makes JIT difficult as it would require even smaller runs.
- Large distances between various production centres.<sup>4</sup> There are four major areas of automotive production in South Africa. Samcor, BMW and Nissan are located in the Pretoria region, Toyota is in Durban, Mercedes-Benz in East London and VW and Delta in PE-Uitenhage. Port Elizabeth which was pre-eminent as a producing region is located at a substantial distance from the major producing areas of Durban and the PWV. The state owned diesel engine producer, Atlantis Diesel Engines, located in the Western Cape, has an even more adverse location both in terms of proximity to component suppliers and to the heavy vehicle assemblers. One advantage that South Africa does have is its advanced and relatively uncongested road system. Traffic

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4. See Bloch and Payne (1993) for a discussion of locational aspects of the automotive industry.

congestion is the major impediment to JIT in Taiwan<sup>5</sup> and imposes increasingly severe constraints in Japan and Europe.

- Large fluctuations in production levels add to the problems of operating a JIT system.

The limited development of JIT needs to be kept in perspective, however. Most component firms did not feel under particular pressure in this regard and one reported that it only applies to exports! It is also necessary to bear in mind that the CKD packs which comprise a large proportion of the parts are imported from Germany or Japan with lengthy shipping times.

### Automation

Assembly is difficult to automate except for welding and painting. Even in the advanced countries, final assembly remains fairly labour intensive in most plants including some of the most productive. Levels of automation are clearly very low in South Africa but it would be inappropriate to compare them to the advanced countries which have far higher labour costs. In South African assembly plants, the major areas of automation are in welding, painting and certain areas of final assembly such as mechanical handling. But in most plants many of these functions are still performed manually.

#### **BOX 3.1** ***Building the 'Mandelamobile'***

Productivity improvement on the shop floor under lean production depends essentially on workers being highly motivated. Thus innovations such as 'quality circles' and 'green areas' which are aimed at fostering a team approach and utilising the detailed knowledge and experience of the workforce to improve productivity are unlikely to succeed when introduced into an antagonistic shop floor situation with a hierarchical employment structure as prevails in South African assembly plants. The impact of high levels of motivation on productivity was graphically illustrated when workers at Mercedes Benz decided to build a car for Nelson Mandela following his release in 1990. This was negotiated with management and workers put in unpaid overtime to produce the top of the line Mercedes 500. This car was the best quality car ever made at MBSA. It came off the line (before rectification) with only 9 faults, a figure significantly lower than that achieved in Germany and a fraction of the MBSA average of 90 faults. The car was built without supervision and in record time with the normal 28 days in the factory being reduced to eight.

Interview with Ludwe Bakaco, Mercedes Benz shop steward. See also *South African Labour Bulletin* (Vol 15, No 4, 1990) interview with C. Kopke, MBSA chairman.

5. Interview with Tseng Tsing-Tsai, director, San Yang Industry Company, Taiwan.

## Production organisation

The most striking set of differences which certainly impacts on shop floor productivity is around the organisation of production, training and job classification. A key area of Japanese success has been the involvement of the workforce in schemes to upgrade productivity and quality. These can be illustrated by the emphasis on a team approach and the utilisation of the accumulated skills and experience of the workforce in productivity improvement (illustrated by the enormous number of suggestions offered by the workforce). Another key innovation is the emphasis on flexibility and the capability of workers to perform a variety of tasks.

There have been a number of attempts to introduce such methods into South African automotive plants. On the whole they have not been very effective as evidenced by ongoing strike action and low levels of participation in management initiatives on productivity. Workers regard these schemes with suspicion and are reluctant to participate in productivity raising schemes which may help profitability but which will not benefit them directly. In many cases they are correctly perceived as attempts to sideline the union.

### **Box 3.2** **Green areas at Nissan**

Nissan management argue that their experience with the *genba kanri* shop floor management system has been very successful.<sup>6</sup> Following the crisis they faced in the early 1980s, Nissan introduced a new form of shop floor management (*genba kanri*) with the assistance of the parent company. The *genba kanri* system is based on Japanese notions of teamwork (based around the green area concept), flexibility (the introduction of elements of multiskilling) and continuous improvement (*kaizen*). While the system is paternalistic and explicitly aimed at removing the need for workers to join the union, it has clearly been effective in establishing better communication between management and the shop floor. Management claim that it has achieved the following:

- the lowest absenteeism and latecoming record in the industry. It is currently 3% and has been reduced from 25–30% in the early 1980s.
- the lowest rate of turnover for operators in the industry (0.5% per month). This helps quality and the flexibility of the labour force increases.
- a high safety rating.
- relatively low rates of strike action.
- involvement of the workforce in continuous improvement of quality and productivity via suggestion schemes etc.

6. Interview with Bill Middleton, Genba Kanri shop floor manager, Nissan, 1992.

South Africa's current industrial environment is not the most receptive place for the introduction of forms of production organisation which are more cooperative and aim at harnessing the accumulated skills and experience of production workers. The high number of job classifications and low training levels are indicative of one aspect of the problem. Even more revealing would be comparable data on salary/wage differentials between management and production workers, career pathing etc. The point is that attempts to introduce lean production into the shop floor situation of the typical South African plant are bound to have limited success in situations of huge disparities in management and worker incomes, a hierarchical division of labour and racial divisions.

### **Cooperation between assemblers and their suppliers**

Japanese carmakers have pioneered a system of close cooperation between manufacturers and first tier suppliers which is now being emulated in Europe and the US. It involves assemblers assisting major component producers to upgrade themselves, cooperating on R&D and developing long term relationships whereby the benefits of technological and productivity advances are shared.

The situation is very different in South Africa where there is little cooperation between component producers and suppliers except insofar as the industry is small and personal contacts play an important role.

Most component producers do not receive significant assistance from assembler firms and do not see a significant trend towards closer cooperation. Many regard the assemblers as expedient and short-sighted for moving swiftly to use foreign components and endangering the long term viability of the components sector on which the assemblers ultimately depend. There is also little co-operation between the assemblers federation (NAAMSA) and the component producers federation (NAACAM). But in certain selected cases cooperation is occurring especially where the components firm has been drawn into Phase VI exports.

## **3. Competitiveness of components production**

A modern motor vehicle consists of approximately 10 000 components. This provides the heart of the vehicle and final assembly accounts for only some 20 percent of total production costs. The South African components sector is widely regarded as being uncompetitive with prices above world market levels (see Table 3.3) and owing its existence mainly to protection and local content requirements. However, there are many areas where South African components are competitive not only in the domestic market but also in foreign markets.

### **3.1 Impact of the local content programme**

The development of components production was determined by the character of the local content programme and the protection afforded to CBUs. The proliferation of producers in a small market meant that component producers had to produce a wide variety of products with sub-optimal production runs. This was exacerbated by the fact that the local content programme was mass-based. This encouraged investment in heavier parts such as body pressings with high tooling costs which were totally uneconomic at low volumes.

The transition to Phase VI was a turning point in that it involved a shift to a value based programme and local content could also be partly met by exports. Export success has allowed Phase VI OEMs to increasingly source components overseas. The problems of the component sector have been compounded by the fact that there has been no rationalisation of the number of makes and models, in fact rather the reverse, so that the problem of scale economies in the domestic market remains severe. Some firms have been hit hard by the new sourcing arrangements of OEMs and NAACAM, the component producers federation, has warned that there could be large scale bankruptcies.

### **3.2 Economies of scale**

As indicated in Chapter One, economies of scale are more important in component manufacture than assembly. While flexible automation and production reorganisation have increased the variety of products that can be efficiently produced in a single plant, there is little evidence that they have significantly decreased optimal plant size. Flexible machinery gives flexibility but dedicated machinery remains quicker and cheaper for high volume production. Small scale production means that tooling costs have to be amortised over a smaller number of units, setting up times for new batches become a major cost factor and quality is more difficult to control. It also becomes more difficult to automate production.

An obvious solution for some component firms is to develop themselves as world scale suppliers to foreign OEM markets. Some firms have taken this route in a small number of less significant components and aftermarket production serves as a possible entry route. Nevertheless there are substantial difficulties with such a course of action.

Firstly, as has been mentioned above, most firms are not geared to large scale production. Secondly, remote location becomes a more severe disadvantage as JIT supply is increasingly a requirement of foreign OEMs. This is not an overriding difficulty, however, and affects only certain types of components.

Perhaps the most important constraint here is licencing. Virtually all South African components firms are dependent on foreign licensors and many of these agreements regulate exports. The problem is most severe in technologically sophisticated products and is exacerbated by the limited technological capabilities and low R&D spending of most South African component firms. Thus firms producing braking systems, airconditioners etc are more likely to face difficulties than those engaged in the manufacture of alloy



wheels. In many cases, it is locally owned firms which are most affected by this as the foreign licensor will be reluctant to face competition in his traditional markets from a company which is not a subsidiary.

### **Box 3.3**

#### ***Examples of the scale of production in South African components producers compared to international producers***

**Body pressings** – SA firm makes 1000 different components. Press shop in Japan would typically make 150 with much higher total volume.

**Alternators, starter motors, electronic control units** – SA firm produces 300 000 alternators per year. German parent company has just established new plant in Wales with a capacity of 8 million alternators per year. The new SA plant producing electronic control units is more suited to low volume production as it is organised on a cellular basis. A European plant would be similar but with a larger number of cells replicating a similar production process.

**Exhaust systems** – largest SA plant is one third of group's largest European plant and makes a larger variety of products.

**Steering Wheels** – SA plant has capacity of 300 000/year compared to 2 million in German plant which produces a smaller variety.

**Pistons** – SA producer uses 5 lines to manufacture a wide range of pistons at a rate of 60 000 per month. Current batch size of 500 is being reduced to 200. A US based piston producer in the same worldwide group uses 7 highly automated lines to manufacture only 7 variants but has a capacity of 600 000/month.

**Shock Absorbers** – South African subsidiary has a product range wider than any two companies in the US owned worldwide group which has subsidiaries in twelve countries.

**Various components** – Major automotive holding company with several component subsidiaries have conducted a survey of parts produced which indicated that less than 5 percent of the various parts produced were in volumes of more than 2000/month.

Source: Interviews

### 3.3 Raw materials

Raw materials used in the component industry include steel, aluminium, copper, rubber and plastics. The relatively high price of these materials is a major cost raising factor in the industry (Table 3.6).

**Table 3.6**

**Comparative raw material prices. SA price compared to international price (R/ton)**

	SA Price	Import price (excl duty)	Premium
Sheet Metal	2800	1980	41.4%
Aluminium	5300	3491	58.4%
Rubber	4750	3030	56.8%

Source: Interviews

In the case of one assembler the premium on aluminium alone raised car prices by an estimated 3.7%. For certain types of components, the impact is much more severe. For a major steel wheel producer which is moving into the export market, the cost of steel comprised no less than 65% of their manufacturing costs in the case of exports and 50–55% in the case of production for the domestic market where margins are larger.

### 3.4 Areas of competitive strength

Automotive components are extremely diverse and really belong to a number of sectors (metal products, chemicals, rubber, electronics, textiles). They range from sophisticated subassemblies such as transmissions to peripheral components such as wing mirrors and even nuts and bolts. It has been estimated that by the year 2000 electronic items will comprise 20% of the value of a car. One of South Africa's most competitive 'automotive components' is leather seating material. There is, therefore, a wide range of processes ranging from labour-intensive to capital-intensive with a variety of skill and raw material requirements. Thus most countries have appropriate endowments for some kind of components production.

Assembly is for the most part a fairly labour-intensive operation. With the exception of welding and painting, high levels of automation are technically difficult to achieve and exorbitantly expensive. The more highly automated plants such as VW's Golf assembly plant in Wolfsburg, encounter problems with high maintenance costs on sophisticated equipment and are extremely vulnerable to downturns in demand.

### **Flexibility and small batch production**

The typical South African components firm produces a wide range of components in relatively low volumes using dated equipment and a fairly labour intensive labour process although with areas of greater automation.

Important capabilities have thus been developed in achieving the flexibility and the high degree of co-ordination required to produce a large variety of products. The result is that while the industry cannot compete with high volume European and Japanese producers who are the key suppliers to OEMs, it can compete effectively in foreign niche markets. This represents a significant area of competitive advantage. Thus many of the firms which are rapidly expanding exports are firms with a substantial base in the aftermarket and those which are targetting the aftermarket. Volumes are lower in the aftermarket, there is a requirement for a large variety and in many cases, South Africa still produces models which are no longer produced in the principle countries. Thus August Laepple is the leading world supplier of certain aftermarket bodyparts for the old 3 and 5 Series BMWs.

Some of these niches are substantial in volume terms with relatively high margins so that firms can avoid the cut-throat price competition prevalent in high volume OEM supply. They also offer a way into export markets and high volume OEM sourcing arrangements.

Some firms are well placed to take advantage of this market. One such group is T&N Holdings which is 51% held by the major UK based automotive, aerospace and electrical firm T&N plc. Ten percent of its 1991 turnover (R426m) was accounted for by exports, up from less than 3 percent in 1987. This proportion is expected to increase to 25 percent in the next 3–4 years. T&N Holdings has been integrated into the global strategy of T&N plc which is a major world player in components such as friction products, pistons, engine parts and gaskets. It is particularly strong in the aftermarket and the South African subsidiary is increasingly specialising in producing small volumes for foreign niche markets.

### **Mid-low tech items with high raw material content**

Many of the products being exported (steel and alloy wheels, catalytic converters, castings, jacks, body pressings, springs) are items where domestic producers are more able to develop their own design and technical competence and are therefore less subject to the limitations of dependence on foreign licensors. This is the main area where parts are being produced for foreign OEMs particularly in Europe and to a lesser extent the US. There is also limited export to Asia, including Japan.

### **Advanced components**

In a few limited areas, there are indications of substantial capabilities in high tech products. One example are the electronic control units produced by domestic firms which have developed expertise through their experience in the armaments industry.

### **Box 3.4**

#### ***Export to foreign niche markets***

An example of a niche marketing strategy which capitalised on expertise in small batch production originally developed to cope with South Africa's highly differentiated market is the successful entry of T&N Holdings subsidiary, Silverton Engineering into the US radiator aftermarket. This company was quick to take advantage of a substantial shift in the market for replacement radiators. It used to be normal practice to repair rather than replace radiators. This was possible because they were a highly standardised item and reconditioning could be handled in repair shops which numbered some 14 000 in the US alone. With the entry of foreign cars into the US market and the proliferation of model and hence radiator types, there has been a fundamental change in the market and broken radiators are now more frequently replaced rather than repaired. Thus the number of radiator repair shops in the US has declined to 9 000 currently. This has been accompanied by a substantial expansion in the aftermarket for radiators which is estimated at 1.5 million units per year in the US for non-brand parts.

By offering a substantial product range and targeting specialised niche markets, Silverton Engineering has been able to expand exports to the US at prices well above products from Taiwan and China which have been competing on the basis of low prices and high volumes. It has also established its own distribution partnership and is now the fourth largest distributor of radiators to the US aftermarket. In addition to its success in the traditional aftermarket, Silverton Engineering has recently solicited its first original equipment contract for parts and accessory servicing in the USA. The company is also active in the European aftermarket and is exploring opportunities in the Middle and Far East. A sister company exports aluminium radiators to OEMs in Germany. Together exports account for approx R80 million up from virtually zero three years ago.

For a relatively low volume producer (1200–1800 units per day), Silverton Engineering produces an enormous variety of products. It has the tooling to produce in excess of 200 types of radiator and frequently produces in excess of 30 types per day. This is achieved through a highly flexible but labour intensive production process.

South African firms produce a wide range of sophisticated tooling equipment with high local content in both design and manufacture. Many manufacturers regard local tooling as highly competitive. Tooling manufacturers also benefit under Phase VI and exports are rising with at least one firm engaged in the supply and setting up of assembly lines in Europe. The reasons for strong capabilities in an area of capital goods production which requires high design and technological capabilities needs further research. One important factor may be the diversity of South Africa's own industry. The constant retooling that is required with so many different manufacturers appears to have created considerable capability in the tooling industry.

## **4. Conclusion**

This chapter has focused on the factors which explain the lack of competitiveness in the South African automotive industry. It was argued that in most areas the industry is uncompetitive but that to a large extent the lack of competitiveness is due to industry structure rather than to notions such as South Africa not having a 'comparative advantage' in automotive production. Rather the conclusion that should be drawn is a far more optimistic one. The research conducted to date fully supports our basic hypothesis that South Africa could develop a substantial and internationally competitive auto industry.

Policy needs to encourage a more rational industry structure but in so doing it needs to upgrade and develop rather than destroy the important areas of competitiveness and capability that have developed in spite of inappropriate policy. Flexibility and niche market capabilities represent not only an important area of competitive advantage but are also fairly labour intensive with important spinoffs in terms of technology and skills. While rationalisation is necessary, a radical restructuring programme aimed, for example, at establishing capital-intensive and large scale world class components manufacture could easily destroy important existing capabilities. It is important that policy programmes take note of this.

## **Chapter Four: Case studies of firm level restructuring**

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In devising broad ranging policies like trade liberalisation, policy makers all too frequently take insufficient account of the capacity within firms to adjust to such changes. Firms, after all constitute the actual operating units of the economy and any programme of adjustment can only succeed if there is a positive supply response to increasing foreign and domestic competitive pressure. This can take the form of investment to capitalise on new export opportunities resulting from a reduced bias against exports or to keep abreast of international best practice. It can also take the form of measures to improve productivity through plant reorganisation and the upgrading of firm level capabilities. But there is, of course, also a downside – firms may seek to reduce costs by slashing employment and in the worst scenario, increasing competitive pressure can lead to gradual attrition as a downward cycle of reduced profitability and falling investment causes the firm to fall further and further behind.

This chapter provides brief case studies which illustrate how three very different automotive companies are responding, not only to the pressures of growing international competition but also to the opportunities being opened up by greater integration into the global economy.

While these companies are clearly unique, the problems and opportunities they face are similar to those faced by many other assemblers and component producers. They illustrate that South African automotive firms have considerable capacity to react dynamically to the pressures of international competition but that this adjustment process is also constrained in many cases by the particular history and circumstances of individual firms. Also, South Africa currently faces a situation where political and economic uncertainty has meant that there is very little new investment occurring. This tends to mute the supply response resulting from greater global integration. As a result, restructuring spurred by liberalisation has the potential for large scale retrenchment while offering few of the benefits in terms of new investments in export oriented production. This points to the need for trade liberalisation to proceed gradually and to be highly cognisant of the overall environment for new investment.

The first case study is of Gabriel (South Africa), a foreign owned producer of shock absorbers, which has reaped massive productivity gains from the introduction of Japanese style production reorganisation. Atlantis Diesel Engines, the subject of the second case study, is a state owned producer of diesel engines which was in the past widely regarded as a dinosaur from the days of the siege economy. From an extremely adverse position it has made great strides in overcoming its reliance on heavy protection and is moving increasingly into export markets. In an over fragmented industry, BMW is one of the most profitable assembly firms in South Africa. It is increasingly being integrated into BMW

AG's international network. If this process is successful it could play an important role in spurring the development of a world class assembly and component industry.

## **1. Gabriel: productivity gains through reorganising production**

Gabriel is a a medium sized producer of shock absorbers, gas and coil springs and MacPherson struts for the domestic original equipment market and the aftermarket and also for the export aftermarket. Over the past four years, it has been engaged in a process of production reorganisation aimed at introducing Japanese style production techniques with a view to increasing productivity and thereby reducing manufacturing costs. As such it provides an interesting and useful case study of this process in the South African context.

The firm is 86% owned by Maremont and in turn by Arvin Industries (both of the USA). Arvin Industries control twelve shock absorber plants around the world in developed and developing countries including the USA, Canada, India, France, Venezuela and Argentina. One of its largest and most recent investments is a joint venture with a Japanese producer in Spain. These plants, which to a certain extent have different capabilities, compete with each other for orders all over the world. The parent company has been aggressive in encouraging subsidiaries to reorganise production on a just-in-time basis and provides extensive support for this.

Pressure for change has also come from within the company and management and engineering staff appear very committed to new production principles. They are fully aware of the need to become internationally competitive in the face of changing market conditions. Their share (there is one other major domestic competitor) in the stagnating domestic market is seen as optimal. Also, the company foresees that protection will be reduced and that some OEMs may have shock absorbers put back in the CKD packs which would reduce their traditional markets. Exports are therefore regarded as the only area of significant market growth. Unusually, the company does not object to reduced protection in the domestic market.

The firm is therefore seeking to expand exports from the current level of 10–15% of turnover to as much as 50% although 30% is seen as a more realistic medium term objective. It is targeting the foreign aftermarket and its competitive strengths lie in the large range that the company can offer, high quality levels, acceptable prices and small niche market capabilities. Export growth depends on price, quality and delivery times and it is the latter, especially in terms of reliability which presents the main problem. Thus an important objective is to reduce lead times to six weeks in foreign markets and achieve 100% orderfill reliability.

## 1.2 Production reorganisation

The main innovations in production reorganisation have involved the introduction of JIT manufacturing with a cellular layout, the objective being to "supply only the necessary items at the right time and correct volume to the prescribed quality specifications" (Company manual). This was to be achieved by introducing the following changes:

- A flow system to move away from large batch production and thereby reduce work in progress.
- Quick change overs. This would allow for greater flexibility through frequent setting up and smaller lot sizes and can be achieved by training, adaptations to tooling and the elimination of set up by trial and error.
- Small lot sizes of 250 to 500 units. Small lots are preferred over continuous runs even if a large quantity of one component is required. The objective is flexibility and better service to the end user.
- Balanced workload with successive work station cycle times to within 5% of one another.
- Effective layout to allow efficient flow of work and "U-shaped" lines to improve proximity of operators to a number of machines.
- Built in quality and in-line checking. Inspection to be performed by operators at point of manufacture. Use of statistical process control (SPC).
- Frequent parts supply with no interruptions.
- Operators or cell leaders to be responsible for basic maintenance.
- Simple visible planning and each cell to be provided with a daily timetable of units to be produced.
- Continuous improvement achieved by the introduction of action teams (consisting of members of the cell, engineering, maintenance and toolroom personnel) and suggestion schemes.

## Implementation

Implementation so far has been partial with greater success in some areas than in others. The main feature has been the gradual introduction and ongoing improvement of a number of JIT manufacturing cells. Gabriel were advised by a Japanese consultant to Maremont and the parent company's own JIT co-ordinator who visits Gabriel plants around the world to advise on implementation and to train personnel. In 1989 an implementation team was formed in Gabriel (SA) consisting of design engineers, toolmakers and maintenance



fitters. The first major project was a gas spring assembly cell followed by the establishment of a shock absorber assembly cell for which most of the machines were designed and built in-house. Further cells have since been established or are in the process of being set up and by February 1993 the company was at a halfway stage in its production reorganisation. A kanban system is being introduced to address the problem of lead times and levels of work in progress which remain fairly high.

### 1.3 Results

#### International competitiveness and productivity

**Table 4.1**

**International productivity comparisons in the Gabriel group, 1992**

	<b>Units/person day (early 1992)</b>	<b>Plant size and product variety compared to the SA plant</b>
India	24	slightly larger plant
Mexico	27–28	slightly larger plant
South Africa	30	largest variety of all plants
Spain	200	large scale producer for OEMs, only 400 part numbers
USA	110–180	larger plant, less variety
Venezuela	41–42	same size plant, less variety

**Note:** Inter-national differences can be accounted for by a number of factors only some of which are directly the result of firm level productivity (advanced production organisation, automation). Other factors such as product range which impacts negatively on productivity according to the above measure may result from a fragmented domestic market and/or the company targeting the aftermarket which requires greater variety but offers higher prices. Thus the Spanish plant is not directly comparable with the other plants as it produces for the original equipment market. But it also operates on a well developed JIT system and is highly automated.

Table 4.1 gives an indication of how productivity in the South African plant compared to other plants in the Gabriel group in early 1992, according to the measure of units produced per person/day. At this time the South African plant was not really competitive although its niche market capabilities meant that it did have some export capability. The South African plant had attained 45–50 units per person/day by early 1993 and expected to attain 80 during 1994 at which point it will be extremely competitive given its relatively low labour costs. Another measure used is cost of employment as a percentage of sales, which was at 19% (with a target of 15%) compared to the 28% achieved in the US.

The substantial productivity improvements achieved so far have resulted mainly in retrenchments rather than a large increase in output or exports. The company currently employs 340 people, down from 540 a year ago and 640 four years ago. This has included cutting salaried staff from 130 to 70. During this period, output has increased.

Productivity gains are very apparent in some of the new cells. For example, the new gas spring cell has increased production and flexibility but with a substantially reduced labour force (Table 4.2). Fifty percent of production from this cell is now being exported as a direct result of productivity improvements. In the new strut cell, five workers (previously nine) have maintained production at 1000+ units per shift.

**Table 4.2**  
**Productivity improvement in the new gas spring cell**

	Old assembly line	New JIT cell
No. of workers	8	3
Output per shift**	500–1000 units	1000–1500 units
No. of machine changeovers per shift	3–4	7–8
** Shifts were longer on the old assembly line		

### Source of productivity increases

- **Machine set up times**

This has been a major area of improvement and was the initial focus of the team established to introduce JIT. Set up times used to range from 30–120 minutes. This has been reduced to 2–10 minutes in most cases. World class cell performance requires that all machines can be changed within 5 minutes. Under the old system, downtime resulting from lengthy set up times meant that 50–70% of potential production was lost. Reduction in set up times has been achieved in a number of ways. Machine setting was previously performed by a special category of setters while this task is now performed by the operators themselves. Large numbers of

adaptations to machinery have been introduced to reduce set up times. Some of these are extremely minor but have nevertheless been effective e.g. fitting clips to machinery which means that allen keys or spanners are no longer necessary to change settings.

To assist in this process, the company has established a number of small toolmaking companies (consisting of ex-employees) who specialise in making machines more flexible. Most of their work is for Gabriel but they also work for other firms.

- **Batch size**

Batch sizes have been reduced but this has proved more difficult than reducing set up times. Average batch sizes are now 200–300. At one point, there was an attempt to bring them down to 100 but this proved premature as it was found that too much time was being wasted on setting up.

There are other constraints as well. Gabriel's original equipment markets are located at some distance from its Cape plant and it only ships once a week. It therefore makes sense to produce a particular part once a week.

- **Stock levels**

Prior to the reorganisation, the company used to have eight weeks of finished stock. This has been reduced to under three weeks and the aim is seven days.

Stock turns are at the satisfactory level of 20 per year. However, with reduced stock levels the orderfill rate (percentage of orders fulfilled on time) has come under pressure.

## **Economies of scale and flexible specialisation**

Most component firms consider that wide variety and low volumes place them at a considerable disadvantage both in export markets and competing with imports in the domestic market. In only a few areas have firms been able to establish world scale facilities with relatively high degrees of automation. Thus there is a strongly held view that rationalisation of the number of models and makes would result in greatly improved competitiveness. At the same time it has been argued by some of the more vocal champions of lean production that Japanese style production allows for the efficient production of a large variety of products and reduces minimum efficient scale.

The experience of Gabriel provides some support for both views. Gabriel is a low volume, high variety producer. Production reorganisation has centred around productivity improvement while maintaining this flexible capacity and even making a virtue of it. However, even for a firm which has gone a long way towards implementing lean production methods, the fragmentation of the South African market remains a problem. The firm produces in excess of 700 part numbers and has a product range which is higher

than any other two companies in the Gabriel group combined. It has to deal, for example, with 17 diameters of piston rod while the maximum in other companies is 7–8. As an extreme contrast, the Spanish plant which operates on a JIT basis has achieved high productivity on the basis of dedicated automation. A Gabriel production manager who visited the Spanish plant reported that one of its automated shock absorber lines had been producing 6000 units per day of the same part number for the past 4 months. The South African operation produces a total of 6500 units per day including struts and gas springs in a large range of types.

Thus in spite of the strides they have made in flexibility, management believe that significant gains could be made by standardising various components and reducing overall variety.

### **Process of change and reaction of the union<sup>1</sup>**

Workers have reluctantly accepted the changes at Gabriel. While they are fully aware of the need for productivity improvement to maintain the viability of the plant in the face of international competition, the main impact of restructuring has been retrenchment. While the company claims that this is necessary to create the basis for future expansion, the benefits (in terms of new employment) have still to materialise although current jobs appear secure.

As has been the case in other situations in South Africa and elsewhere the union finds it difficult to respond to the negative aspects (retrenchment) resulting from restructuring. With some success they have tried to ensure that greater efficiencies and cost-cutting also took place in other parts of the firm. Thus the layers of management have been substantially reduced and the number of salaried staff have been cut back in roughly equal proportion to hourly paid workers. The union also fought for and were successful in achieving a reduction in management perks such as company cars.

Workers complain that the intensity of work has increased under the cellular system and coupled with excessive overtime being worked is an important reason for the growth of absenteeism even though a bonus system has been introduced in an effort to limit this. While they accept that training has increased they argue that multiskilling has resulted 'in people working harder, not smarter'. They have not opposed the introduction of 'green areas' which have been seen in some firms as an attempt to undercut the union. Instead they are seen to have some advantages and clearly serve as a place where union organisational work can also be conducted.

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1. This section is based on an interview with members of the shopstewards committee.

## 1.4 Implications for policy

Gabriel is in many ways a typical South African component company. It produces a vast range of products and historically this has raised costs and limited the scope for further automation. This is a situation faced by many South African component firms. There are two alternative routes available to such companies. One would be to increase specialisation and thereby generate greater economies of scale. This would involve transforming themselves into high volume suppliers with foreign OEMs probably comprising a significant part of their market and would require greater levels of automation. The alternative is the direction that Gabriel has pursued – making a virtue of product variety and increasing its efficiency in flexible production.

The latter course offers a number of advantages from the perspective of the national economy:

- it illustrates the gains that can be made through re-organisation on the shop floor.
- it economises on capital. There has not been a major emphasis on introducing new automation. Investments in capital equipment have primarily been low cost incremental innovations designed to improve the functioning and flexibility of existing machinery rather than adding new equipment.
- it has generated substantial opportunities for learning and indigenous technological adaptation. The company has developed significant toolmaking and machine building capabilities and is thus able to modify its capital equipment and in some cases even build its own machines.
- this form of restructuring may generate significant possibilities for small firms. Gabriel has assisted in establishing small toolmaking firms on a subcontracting basis. This cluster of small firms are engaged mainly in modifying machinery to make it more flexible. This kind of expertise clearly has significant external benefits.
- in an ideal situation, restructuring would enable productivity improvement to be immediately translated into higher total output with unchanged (or even increased) employment levels. This is why the process is always more difficult when markets are stagnating and little new investment is taking place. Under these circumstances it is difficult to generate worker support for these programmes – the more likely scenario being resigned compliance in the face of the alternative being even worse. At the broader industry level, therefore, account needs to be taken of the state of the overall economy in the timing of liberalisation measures which would tend to accelerate the process of plant level restructuring. Phase VI was introduced at the worst possible time in this respect. Attention also needs to be directed to the problem of encouraging new investment into the industry.

## 2. Restructuring at Atlantis Diesel Engines<sup>2</sup>

Atlantis Diesel Engines (ADE) is a large state owned (Industrial Development Corporation, 87.5%; Mercedes Benz AG, 12.5%) producer of diesel engines and components. It was established as a strategic industry in 1981 to ensure that the country was self-sufficient in diesel engines as political isolation deepened. Its location in Atlantis, north of Cape Town (also for political reasons) is far from both supply networks and domestic markets although it does have the advantage of being close to a port. In many ways it encapsulates the problems of the South African component industry albeit in a more extreme form. From the start it has been highly protected, the priority being to establish productive capacity in a wide range of engines with cost being a lesser consideration. Thus the plant was designed with an annual capacity of 45 000 engines (two shifts) divided into two engine makes (Perkins and Mercedes Benz) and the capability to produce a wide model range. World scale diesel plants produce in excess of 100 000 engines per year of one engine make with a smaller model range.

Engine sales accounted for 68% of 1992 turnover of R440 million with the remainder consisting of parts and exported components. ADE's share of the domestic truck and tractor engine markets has fallen slightly but remains high (97% in the case of heavy truck engines). High market share results from the plant being established as a protected strategic industry to the extent of locally built engines virtually being required equipment<sup>3</sup> on heavy trucks and gaining large market share for tractors and medium sized trucks even though prices were well above international levels. The main problem has been severe recession in these markets and total engine sales have slumped from a high of 22 955 in 1984 to an average of 10 900 for the years 1990–1992.

Heavy vehicle assemblers were initially opposed to fitting the ADE engine because of the cost impact and concerns over quality. ADE has, however, attained high quality levels and gained an ISO 9001 rating at its first attempt. Price premiums over imported engines were high during the 1980s, but prices have been reduced by approximately 20% in real terms over the period 1991/92.

Standardisation of a major component in a market characterised by a similar proliferation of assemblers as prevails in the assembly of passenger cars has two major advantages. Firstly, it makes domestic production potentially viable (if the demand for engines had been stronger, production costs would have been substantially lower). Secondly, because the majority of tractors, heavy and medium commercial vehicles in use in South Africa are now powered by ADE engines, standardisation has rationalised servicing and spare parts supply in Southern Africa.

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2. This section draws on a series of interviews with management and shopstewards at ADE as well as media reports.
  3. When ADE was established an excise duty of 30% was applied to trucks but was fully rebatable if ADE engines were fitted. Under Phase VI, an ADE engine is deemed to be 40% local content to which is added actual local content (65%) to give a local content 'value' of 105%.

## **2.1 Problems facing the firm**

### **Capacity utilisation**

The plant has never operated at full capacity and the underutilisation of capacity is the most serious problem facing ADE. In early 1993 the plant was operating at 50–60 percent capacity on one shift while ideally it should be operating two shifts with each running at 70%.

### **Product variety and economies of scale**

There are three major stages (casting, machining of components and assembly) in the production of engines, all of which are performed at ADE. There are large economies of scale in casting and machining and high rates of capacity utilisation are important in these capital intensive processes. In the foundry, the amortisation of tooling is the major factor impacting on economies of scale. For example, the tooling costs for a cylinder block are approximately R3m. The result is that at volumes of 5 000 units per annum, a truck engine cylinder block casting can be produced at a price of R310 while if volumes were to rise to 30 000 the price could be reduced to R250 per unit. A typical European foundry would have a capacity four times larger than ADE and produce six major components (compared to 20 at ADE).

Machining is a capital intensive process and at high volumes dedicated lines are quicker and cheaper. Increasing flexibility is usually limited to producing components from the same 'family' on one line. For example, a recently introduced flexible cylinder block line could produce a maximum of four different types of cylinder block all within the same 'family'. Engine assembly is more labour intensive and lends itself to flexible working practices. Minimum efficient scale is therefore lower than in casting or machining and one plant can more easily handle a variety of products.

## **2.2 Restructuring**

With a history of accumulated losses and the expectation of reduced protection under Phase VI, the company embarked on a major restructuring programme in late 1990.

### **Cost cutting through retrenchment**

There have been drastic retrenchments in employment over the past few years and employment in early 1993 stood at 1700 compared to a peak of nearly 3 000 in 1989. Retrenchment has been across the board and the number of salaried staff has been reduced by 47% between late 1990 and early 1993 with further reductions planned.

## **Reducing supply costs**

Local content in ADE engines is around 60–65% by value. The company has in the past had to deal with two poor sources of supply, one in the form of overpriced CKD packs and the other being high priced domestic subcomponents, which were nevertheless competitive because of inflated import prices. ADE has managed to win substantial discounts from foreign suppliers of CKD packs in turn putting domestic subcomponent producers under pressure.

## **Increasing capacity utilisation**

ADE has sought to increase capacity utilisation through exports and diversification into related fields.

- **Exports**

Exports outside of southern Africa have increased from R15.8 million in 1989/90 to R40 million in 1992/3 and this is seen to be a major growth area. In 1989/90 the only non-African destination was the UK but ADE is now also exporting to Germany, Brazil, France and Argentina, its strength being in fairly small volume, niche markets.

In terms of its licensing agreements with MBAG and Perkins, ADE is constrained in export markets to a certain extent. For example, engines cannot be exported outside the Southern African Customs Union unless fitted to a vehicle or as part of a power pack etc. A company seeking to expand exports into the global networks of its licensor is at a disadvantage if the licensor holds only a small equity stake.<sup>4</sup> It can mean that ADE becomes a 'saw tooth' supplier, restricted to supplying niches in the global networks at times of high demand with markets difficult to come by during recession as the licensor strives to make maximum use of its own capacity.

- **Diversification**

ADE has diversified into areas such as tractor assembly and diesel engines for power packs. It is also experimenting with diesel engines for minibus taxis. Diversification is seen as a future growth area but one obvious problem is that it adds to the already wide range of products being produced.

## **Productivity**

The company is involved in a major drive to improve productivity through implementing lean production methods with enhanced flexibility the major objective. According to the technical director, "variety used to be a dirty word – we see it as an opportunity".

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4. One licensor (MBAG) holds only 12.5% of ADE while the other (Perkins) has no equity stake.



- **Reducing the cost of quality**

Quality standards are high. The objective is to reduce the cost of achieving this by introducing operator self control and quality circles. One indication is the significant reduction in scrap levels that have been achieved.

- **Training**

Training emphasises multiskilling and a team approach. The number of grades has been sharply reduced and the ratio of indirect:direct workers has fallen from 1.6:1 to 1.2:1 (still a high level).

- **Logistics**

ADE is trying to reduce work in progress and finished stock levels by 50% over the next couple of years from the currently high level of R40 million.

## **2.3 Union responses**

The dominant experience of restructuring at ADE has been the drastic retrenchments that have occurred over the past few years. Unions have opposed these arguing for training and retraining and for sacrifices to be made at management levels as well. At the same time workers, recognise the serious structural problems that the company faces being far from its markets and suppliers and dependent on foreign technology. Workers are extremely concerned about the future of the company and are fully aware of the need to improve productivity in the face of increasing international competition.

The need for improved work organisation is accepted and it is also recognised that positive measures have been introduced such as the reduction in wage grades from 11 to 5 which is currently being negotiated. But workers clearly see work reorganisation from a different perspective to management. It has to be established on a sound basis the main elements of which are:

- genuine participation in the restructuring process by the workforce. It was strongly felt that there is a lack of consultation and a lack of information on the restructuring process, which because it involved workers being moved to new work areas and jobs had caused confusion and discontent on the shop floor.
- a major emphasis on training and accreditation of operating skills not just formal certification. This is a major point of contention especially with regard to new forms of production organisation such as multiskilling. Multiskilling is supported as long as workers are recognised for new capabilities. For example, general operators (Grade DDD) now rotate to different assembly areas and also take greater responsibility for quality control but feel that they have not received recognition for these new skills.

- development of a proper career pathing system for all employees. Workers feel discriminated against on racial grounds as well as having limited opportunities to advance into salaried positions.
- the principle that motivating shop floor workers in difficult times has to involve sacrifices across the board.
- above all, workers emphasised the need to establish a relationship of trust with management. Although the company has stated that there will be no further retrenchment, talk of restructuring generates great concern. For quite valid reasons, workers have a strong perception that productivity improvement leads to retrenchment and this clearly impedes the introduction of productivity enhancing innovations in work organisation.

## 2.4 Implications

Atlantis Diesel Engines illustrates a number of the issues and problems being faced by other component producers who need to restructure in the face of increasing international competition:

- Before Phase VI, the firm faced little competition and produced a high priced, uncompetitive product.
- The company was established with the purpose of maximising local content and self sufficiency. It produces an excessive variety of products and the nature of its international linkages make the creation of large volumes through export difficult.
- Standardisation has been a major plus factor but even where government has taken firm action to promote this as in the case of ADE, it is only a partial solution because the South African market is so small. The same limitations would apply if standardisation of car engines was introduced.
- Productivity gains in the midst of severe recession are bound to lead to retrenchment. Under these circumstances, it will obviously not be possible to gain the support of the workforce who at best will reluctantly accept new forms of work organisation as being necessary to prevent a worse situation arising.
- Having created the current structure of the industry, trends in government policy look set to undermine the gains of improved productivity and competitiveness that have been achieved at enormous cost in terms of retrenchment. These gains are being undermined by the entry of a wide range of foreign trucks (and engines) into the South African market. Most of these are coming in as SKD packs with only the most minor assembly being carried out locally.

All the above have implications for the component industry as a whole. They point to the need for policy to:

- reduce protection gradually seeking to spur productivity gains but mindful of the capacity of firms to respond especially during recession.
- gains can be made through standardisation and reducing numbers of models but this course of action offers only a partial solution.
- South African component suppliers, characterised by low volume, highly variable production can improve productivity enormously by introducing innovations which improve flexibility. But the right 'environment' in terms of involvement by the workforce has to be created if these innovations are to be successful.

### **3. Is South Africa a high cost location for assembly? – the case of BMW**

South Africa currently has many disadvantages as a site for the assembly of vehicles for export and locally produced vehicles are priced well above world market levels. Component supply is well below world standards and the country is also far from major international markets. Recent media reports that BMW plan to produce right hand drive vehicles at volumes of around 100 000 per annum for the world market have thus caused some surprise. Closer investigation has revealed that these figures are exaggerated but that small scale export (approximately 4 000 vehicles) will begin in 1994 and exports of 50 000 vehicles per annum by the end of the decade is seen to be a realistic target. The objective is to specialise in one or two models in the South African plant, thereby obtaining economies of scale and bringing down unit costs.<sup>5</sup>

#### **3.1 Why a South African location may suit BMW.**

##### **BMW's global strategy**

BMW AG is a highly successful specialist producer of motor vehicles. In 1991, it achieved record sales of 550 000 cars worldwide almost all of which were produced in Germany. Its only other plant until very recently has been the small South African assembly operation which produced less than 16 000 vehicles in 1992. When the international economy revives the company will need new capacity and is building a small plant in the US with a capacity of 70 000 per year. Further capacity is unlikely to be installed in Germany which is regarded as a high cost location. The possibility is, therefore, for South Africa to be developed as a much more significant part of its expanding global production network.

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5. Much of the information in this section is drawn from an interview with Erich Papke, Corporate planning manager, BMW(SA).

BMW currently services its international markets from its production base in Germany. Outside of Europe its main markets are the US and Japan. The South African market itself is not insignificant. In 1992, South Africa was the seventh largest market for BMWs world wide and the company attained a higher market share (8.6%) than in any other country, including Germany.

### Labour and other costs

Germany has become a high cost location for automobile production. Its wage costs (including social security payments) are the highest in the world. BMW have calculated that if wages, social security payments, length of the working week and length of holidays and sick leave are taken into account, the cost of labour in Germany is DM64/hour compared to DM9/hour in South Africa. Even with considerably lower productivity, South Africa is still potentially highly competitive (see Table 4.3) and labour costs in assembly amount to only 2–3% of full manufacturing cost compared to 6–8% in Germany. The differential in labour hours to produce a vehicle is expected to narrow with productivity in the South African plant reaching 90% of the German level in the next few years as a result of new capital expenditure, training and increased volumes. Lower levels of automation especially in the body shop will account for the remaining differential. The productivity of capital is much higher in South Africa because of lower levels of expensive automation.

**Table 4.3**  
**Comparative labour costs in BMW assembly plants**

	German plant	SA plant
Hourly compensation cost	DM64	DM9
Direct labour hrs/vehicle	29.1	46.6
Labour cost/vehicle	DM1862	DM419
SA plant labour cost advantage	DM1443	
Source: Data supplied by BMW		

Overhead costs such as infrastructure, staffing and management costs are also considerably lower in South Africa which has the advantage of low energy costs and less stringent environmental regulations.

### An existing facility

The existing assembly facility gives South Africa a major advantage over other locations. BMW say that in South Africa they "have the swimming pool even if it does not have any water in it". The basic plant (which has a replacement value of R600m), management

structure and a trained workforce is in place and would be extremely expensive to create in another new location.

### **Raw material advantage**

The fact that South Africa is a major producer of many of the raw materials such as steel and aluminium used for carmaking is seen as a further potential area of strength although current pricing policies impose a disadvantage on users of these materials.

### **Component supply**

Component supply represents the major problem for using South Africa as a production base. BMW would require free importation of components and initially local content would be lower (1/3 of material use) than current levels. They have grouped existing component suppliers into three roughly equal categories. Group A comprises those which are already economically viable. These include components which are already exported to BMW in Germany such as automotive leather, radiators and aluminium wheels. The leather plant which exports on a JIT basis to Europe has been rated as the third best out of 900 suppliers to the German plant. Areas of competitive strength include more labour intensive and raw material intensive items and, interestingly, certain highly sophisticated components such as electronic control units where advanced R&D capabilities have been acquired by domestic firms such as Altech partly through involvement in the defence industry.

Category B comprises a group of component suppliers which would be economically viable if certain structural problems were addressed. These structural problems include raw material prices, the constraints imposed by short production runs and the need for increased international competition which would force firms to improve quality, delivery and other standards as well as reduce their profit margins. Group C comprise component firms with little scope to become internationally competitive. Many are restricted by licence agreements and large royalty payments of approximately five percent of the sales price and have little scope to build up volumes to become internationally competitive. These include many of the more sophisticated and major components.

One third of components currently used are in category A or can easily reach this level. BMW estimate that this could almost double within 3 to 4 years.

## **3.2 Significance**

Plans to more than double production volumes are, in themselves, significant but would also boost the component industry. Local content would be at much lower levels initially but such a scheme offers major advantages to sections of the domestic components industry. Components produced for BMWs assembled in South Africa for export could also be exported to the German assembly plants. Thus this opens up significant

opportunities for large scale production in an expanding range of components subject, of course, to exacting performance and quality standards. The same problems such as high labour costs that impact on German assemblers affect component suppliers<sup>6</sup> and BMW, along with other German firms, expect that sourcing from outside Germany will increase over the next several years. If this project goes ahead successfully it could have a substantial demonstration effect on the rest of the industry by illustrating that South Africa can be a viable location for automotive manufacture thereby encouraging investment in world scale plant.

### **Potential problems with the above scenario**

There are, of course, question marks over whether BMW will need additional capacity even when the recession ends. The American plant will add to worldwide capacity from 1994. Also BMW AG, which has been very successful over the last decade (car sales rose each year from 1982 to 1991), will face increasing competitive pressure in its core European market from Japanese luxury cars such as the Lexus and Infiniti. So the use made of the South African plant will depend not only on the efficiency of the plant and its domestic supplier network but on international trading conditions.

Greater integration into the global industry carries certain risks for the branch plant location. With its role and strategy determined by the foreign parent, it could face the prospect of being a 'saw tooth' supplier with capacity being used in periods of peak demand and falling sharply during downturns to maintain capacity utilisation in the more automated home country plants.

Some traditional component suppliers (those in category C) would lose heavily under this strategy because BMW would require free access to imported components at least for the exported vehicles. Import content in these vehicles would initially be high. Many traditional suppliers would not be able to achieve the world class standards in terms of quality and price that would be required under this scenario. However, the macro impact on the component sector would be positive in terms of total output generated.

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6. BMW AG's expenditure on materials as a percentage of the total value of production has increased steadily from 53.3% in 1982 to 61.3% in 1991 (Annual Report, 1991).

## **Chapter Five: Which way forward for the South African motor industry?**

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The central objective of this study has been to develop a broad policy programme for the future development of the automotive industry.<sup>1</sup> This chapter begins with a broad statement of objectives and a discussion of the overarching areas of strength in South Africa's industrial economy and then moves to a more focused discussion of potential growth paths for the industry and the principles on which trade policies, rationalisation measures etc. need to be based. For the most part a detailed elaboration of a specific policy programme (such as precise levels of protection) is avoided.

Past policy has suffered from a number of defects:

- The main instrument of policy has been the high rates of protection on built up vehicles and a series of local content requirements supplemented (under Phase VI) by a form of foreign exchange balancing. There has been little attempt to go beyond protection and export incentives and develop a set of enabling policies aimed at upgrading the capabilities of the industry. Partly as a result of excessive protection the industry has not kept up with global developments in areas such as organisational change and automation.
- The trade regime itself has lacked long term direction and has been subject to frequent changes. Companies in the auto industry need a coherent set of rules which provide long term direction in order to facilitate planning.
- Protection has been indiscriminate. For example, it is predictable that high rates of protection on CBUs will attract a proliferation of manufacturers content to establish small scale assembly plants. If protection was to be applied, policy should have gone a step further and restricted new entrants into the industry and perhaps introduced other rules to prevent excessive proliferation.
- The change of direction under Phase VI, while introducing important improvements, has taken little account of the capacity of the component sector to adapt to rapid change. Before the fragmented industry is exposed to a sudden reduction in protection it needed to be given an opportunity to specialise and expand volumes in order to be able to better cope with global integration.

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1. This chapter draws on discussions with Alec Erwin, formerly NUMSA education officer, in his capacity as chairperson of the Research Committee of the MITG Long Term Working Group. The important related questions of environmental and transportation policy are not discussed here. Some brief comments are contained in Appendix 4.

- High rates of protection have until now been maintained on CBUs and this has encouraged greater proliferation. It is, however, essential that steps are taken to encourage rationalisation in the assembly industry before protection is significantly reduced.

## **1. Statement of objectives and long term strategic considerations**

The starting point has to be a conception of what the automotive industry should look like in 10 or 20 years time. Objectives have to be set and a very clear decision has to be taken that the industry has a long term future and is worth developing. To date the industry has imposed large costs on the economy. Localisation has taken place only behind the protective wall created by local content requirements, resulting in consumers paying high prices for new vehicles. Exports have been highly subsidised. So one possibility would be trade liberalisation leading to an industry with very little, if any, assembly activity and, at best, a few specialised component suppliers which are heavily integrated into global markets.

The discussion in this chapter makes a starting assumption that the industry must be developed and indeed has considerable potential. We argue that it is quite possible to realistically envisage by the year 2005 a large and dynamic industry which is:

- supplying affordable vehicles to a substantial and growing domestic market and also exporting vehicles and components on a significant scale to an emerging African market as well as to other countries.
- generating an expansion in quality employment as well as small business opportunities in the production of subcomponents.
- operating close to the international cutting edge of technological development and having developed significant technological capability in certain areas of product and process technology.
- characterised by world class production organisation.
- characterised by very high local content in some vehicles although much lower in others. More importantly, although imports will have expanded rapidly, the rapid growth in exports will mean that the industry has come close to achieving a balance in trade.
- attracting significant new domestic and foreign investment. Some South African components firms will have emerged as world class producers with significant R&D capability and be exporting to OEMs worldwide.



## 2. Our long term competitive advantage

The starting point for a policy oriented analysis of the restructuring that is required to achieve the above scenario is an identification of some of the basic, underlying sources of growth and potential competitive advantage. In deliberations on competitive advantage and the determination of long term policies, it would appear logical that these factors should carry at least as much weight as current car making capabilities. After all, if Korea had determined its shipbuilding policy on the basis of its capabilities at that time, it would never have become the world's biggest shipbuilding nation for the simple reason that at the time the decision was taken to develop this sector, Korea had no shipbuilding industry!

### 2.1 The domestic market

The industry is located in an economy characterised by low growth, fairly low average incomes and a very unequal income distribution. As a result, not only is the market static but market penetration in the sense of vehicles per head of population is low (see Table 1.1). The potential market measured by population is, however, very large and could grow quickly. This is especially the case if the regional market is included.

In determining long term policy direction, this fundamental fact must be taken into consideration. Our starting point is, for example, very different to that of Australia which has been through an extensive restructuring exercise since 1985. Australia is a developed country with a high average income and relatively egalitarian income distribution but a relatively small population. In 1990, there were 1.7 persons per vehicle in Australia (compared to 7 persons per vehicle in South Africa). Future growth prospects in Australia will be primarily limited to replacement demand and furthermore, the growth prospects in such an economy probably lie in the more advanced areas of manufacturing and in the service sector. These factors place certain constraints on the expansion possibilities of the Australian industry.

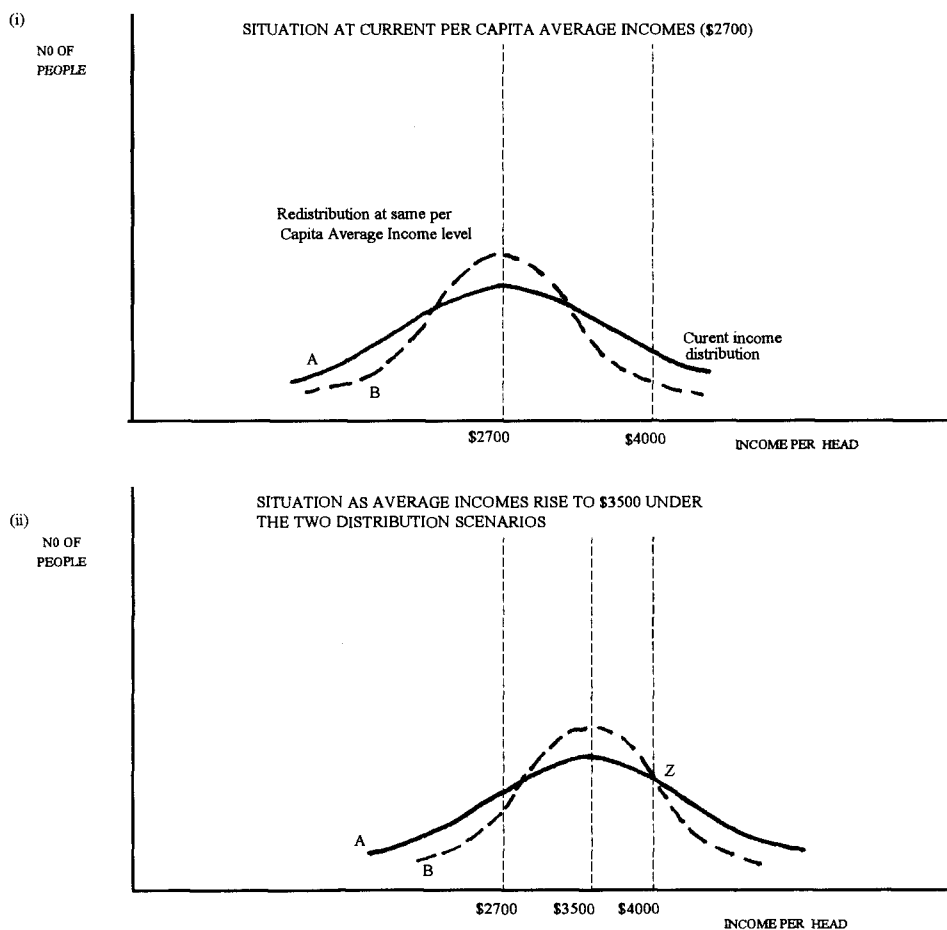
Demand for vehicles is very income elastic and South Africa faces a different set of opportunities and constraints resulting from its low average per capita income and the prospect of redistribution over the next decade. This is illustrated conceptually in Figure 5.1. Average per capita income currently stands at \$2700 well below the \$4000 level which, according to some studies,<sup>2</sup> is the threshold for car buying. It is clear from Figure 5.1 (diagram i) that as incomes rise, the percentage of the population with incomes above the \$4000 threshold rises far more rapidly. This is what is currently happening in some of the rapidly growing East Asian countries such as Malaysia which are experiencing rapid growth in demand for new vehicles.<sup>3</sup>

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2. See 'Chinese consumers: next in line', *Economist*, 23 January 1993.

3. Average per capita incomes in Malaysia rose by 40% between 1987 and 1991; car sales by 290%.

**Figure 5.1**  
**The impact of rising incomes and income redistribution on vehicle demand in South Africa**



Note: The normal distributions in the diagrams above are purely for illustrative purposes and are not meant to represent actual income distribution in South Africa.

Redistribution at current average income levels would probably depress demand for new vehicles as illustrated by the current income distribution curve (A) lying above the redistribution curve (B) at the \$4000 level in diagram (i). However, if incomes rise and redistribution takes place one will soon reach the point where the growth in new buyers (though not yet the total car market) is higher under the redistribution scenario curve (B) in diagram (ii). This occurs at point Z, the point at which more people are moving into the \$4000 threshold under the redistribution scenario (B) than under the existing income distribution (A).

To summarise, therefore:

- if growth occurs, the car market will expand very rapidly (at a rate well above the overall growth rate) given our current level of per capita income.
- redistribution at current levels of real per capita income would probably depress vehicle demand.
- redistribution with growing incomes will soon lead to very rapid growth of new buyers of basic vehicles (as one moves towards a mass market situation).

The implications of growth accompanied by redistribution occurring are that:

- growth would be fastest at the lower end pointing to a need for cheap, basic vehicles.
- it must be remembered that in the current situation (existing local content levels), a growing market will lead to massive growth in imports and balance of payments problems.
- one therefore must avoid policies which artificially pump up domestic demand. Successful Asian producers such as Japan and Korea used heavy taxes on cars in the domestic market and export subsidies in the early stage of development.
- it is therefore absolutely essential that the industry be expanded in terms of local content but also export capabilities.

## **2.2 The advantages of being an intermediate economy**

The major centres of automotive production worldwide are in the rich advanced countries – Europe (especially Germany), the United States and Japan. We demonstrated in Chapter One that important shifts are taking place with producer countries such as Germany coming under competitive pressure. With the strong yen, even Japanese made vehicles are finding it more difficult to compete internationally. The most rapidly growing industries are in certain middle income countries and this trend is likely to become more evident for three reasons:

- their markets are growing rapidly.
- they have the potential to make cars at productivity levels which approach world best practice.
- wage rates and some overhead costs are lower.

An intermediate economy faces major challenges in world markets. However, unlike underdeveloped economies, it has the technological, industrial and human resource capacity to enter world automotive markets for vehicles and for a wide range of components. South Africa is a middle income country. In this important respect it has the potential to take advantage of emerging opportunities.

## **2.3 Natural resources**

South Africa has an abundance of the major materials such as steel and aluminium used in automotive production. Currently this is a disadvantage rather than an advantage because of domestic pricing policies where products such as steel are exported at lower prices than they are available on the domestic market. With the construction of the new Alusaf smelter, there will also now be a larger capacity in aluminium, which due to its weight advantage and recyclability is expanding rapidly as a material in automotive manufacture. Ways need to be found of reducing costs to domestic consumers to the extent that this becomes a source of advantage over international competitors.

## **2.4 Infrastructure**

As is clear from international trends, effective infrastructure is vital to lean production techniques and market competitiveness. South Africa's highly developed but underutilised infrastructure is a major area of potential competitive strength. The comparison with the East Asian NICs is relevant. Rapid growth in countries like Taiwan has stretched their physical infrastructure beyond the limit to the extent that traffic congestion is the major constraint on a more developed JIT system, and power rationing takes place at peak times.

## **2.5 Human resources**

South Africa has a long history of automotive production and considerable capabilities have been established at operator, artisan, technical and managerial levels. Although there are substantial deficiencies and backlogs in certain skill categories and levels of training, overall human resource capabilities exceed those of recent new entrant countries. On the other hand, in spite of the extremely wide differentials between operator and managerial salary levels that prevail in South Africa, the cost of all categories of personnel (including management) is significantly lower than is the case in the advanced country industries.

## **2.6 Tripartite policy making**

As we enter a new democratic phase, tripartite and multilateral forums are emerging to deal with key restructuring issues. If a new strategic direction for the industry is developed in such a forum, it will enjoy wide support and is therefore likely to be more stable. The potential exists therefore, not only for more stable industrial relations but for organised labour becoming a major proponent of the transformation of the industrial structure.

## **2.7 Current areas of competitive strength**

The boom in exports since the implementation of Phase VI has shown that the industry is highly responsive to incentives and can react dynamically to export opportunities. Exports include a wide range of components as well as CBUs. This makes categorisation difficult but a number of areas of competitive strength can be determined.

### **Niche market capabilities**

Most South African component firms produce a wide range of components in low volume. This makes it difficult for them to compete against high volume producers but their flexibility gives them a strong edge in niche markets. One important niche market is the foreign aftermarket where there is a substantial demand for a wide variety of replacement parts, frequently of older models. This is also a market where many of the new entrant Asian producers are not particularly strong as they are generally geared for high volume production.

### **Raw material based mid to low tech products**

Many of our exports fall into this category. They include catalytic converters, steel and alloy wheels, castings etc. Many of these are products where the raw material component and/or energy cost is a significant percentage of total cost and where producers are not excessively constrained by technology licensing agreements. The potential in this area is currently limited by the inflated prices component producers have to pay for raw materials

### **Certain types of sophisticated components**

South Africa has capabilities in a small range of high tech components. These include electronic control units produced by domestic firms using capabilities developed in the armaments industry. Another area is tooling equipment where there are a number of highly competitive domestic firms. Both Anglo American and Eskom have developed advanced batteries which have potential as power units for electric cars.

## 2.8 Future areas of competitive strength

All the above areas can be developed and extended and with appropriate policy, new areas of competitive strength could emerge.

- Flexible Japanese style production methods have huge potential for raising both capital and labour productivity in the niche market area. Because production is so varied in most South African plants the productivity gains from improved efficiencies in flexible manufacturing are almost certainly greater than would be possible in high volume, dedicated plants.
- World scale investments and attention to the raw material cost problem as well as increased capacity in the production of low cost aluminium will improve competitiveness in the mid to lowtech product category.
- It is difficult to forecast future areas of strength in sophisticated components but they would be major beneficiaries of new investment into the industry and a generalised increase in R&D.
- There is also scope for gaining future competitive advantage in assembly which is generally more labour intensive than components production. Assembly is currently inefficient, the main problems being low volumes (and low capacity utilisation), poor component supply, very low levels of automation and outdated working practices. There is considerable capacity for productivity increases in all these areas.
- One of the weakest areas currently is in major components for which high volumes plus technological sophistication is important. Larger volumes and growing indigenous R&D capacity is the key to expansion in this area.

## 3. The growth model

The South African industry is locked into a vicious circle. The domestic market is stagnating and the production structure is highly fragmented with output levels well below minimum efficient scale. As a result the industry is uncompetitive internationally and high costs have put cars increasingly beyond the reach of local consumers. These factors also make it unattractive as a site for new investment. To add to these problems, the industry is faced with a number of serious weaknesses. It is far from major markets, skill levels are limited, the components sector is fragmented and non-competitive and labour relations highly adversarial. The result is that South Africa has become increasingly marginalised as a centre for production.

Is a re-entry strategy possible? Some potential growth paths are discussed below.<sup>4</sup>

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4. This categorisation draws on Womack (1989).

### 3.1 Rapid liberalisation

This strategy would involve:

- elimination of local content requirements
- elimination (or substantial reduction) of tariffs on imports of fully built up vehicles

The motive for rapid liberalisation is that it would lead to lower costs in the domestic market and theoretically by reducing component costs could attract investment in world scale assembly plants which would in turn provide a market for increased production of components also at world scale. However, there would be severe adjustment problems and it is by no means certain that a successful industry would emerge at the end of this process. It is more likely that the chain of events would be similar to what occurred in Argentina where rapid liberalisation was followed by the virtual collapse of the motor industry as imports flooded into the market. This in turn was a factor leading to balance of payments problems and the re-imposition of protection (Cardozo, 1989). This strategy has little to recommend it. Even the argument that consumers would have access to cheap (imported) cars is exaggerated as the balance of payments problems resulting from the flood of imports could lead to devaluation (and higher prices).

### 3.2 The promotion of further import substitution

Elements could include:

- higher local content requirements
- government action to reduce the number of producers and limit proliferation of models
- state supported 'people's car' initiative
- state supported plan to boost local demand

The people's car option would consist of a cheap, basic car appropriate for Southern African conditions which would have a very high level of local content. It could consist of a local design (probably with a foreign partner) or a rehabilitated existing model. Mexico has adopted this strategy with some success in the form of a VW Beetle with no frills and only one windscreen wiper! This car has been a leading seller and has a very high level of local content. Malaysia has developed the Proton which ran into problems of incomes rising too fast and consumers wanting something more sophisticated.<sup>5</sup>

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5. It has, however, had some success as a low cost car in the European market.

Less ambitious policies in this vein include measures to reduce the number of models being produced domestically, skipping models, commonisation of components and local adaptations. All these can reduce costs, increase economies of scale and at the same time provide scope for higher local design content. Taiwan, which also has an overcrowded assembly industry has recently initiated a 'common engine' programme whereby local manufacturers and government agencies will cooperate to develop three standard auto engines. It is estimated that this will cut production costs by as much as 30%. South Africa already has experience of commonisation of engine production in the case of diesel engines for heavy vehicles produced by Atlantis Diesel Engines.

These types of strategies have the advantage of potentially achieving higher volumes and lower costs through standardisation. This in turn could allow for higher levels of local content including full manufacture of sophisticated components with important technology spin-offs.

There are also potential benefits arising out of a more rational structure. For example, a common engine programme can lead to cheaper parts and servicing. These strategies have the support of some component producers.

However, there are also a number of disadvantages:

- Such a programme could raise costs at least initially.
- The more extreme options such as a 'people's car' would probably require initial subsidisation which is difficult to justify given that even a basic vehicle would not be affordable to low income earners.
- Strategies which seek to stimulate the industry through artificially boosting domestic demand (through tax benefits, for example) are generally inappropriate in a middle income country because of their negative macroeconomic implications (greater imports of components, loss to the fiscus) and regressive impact on income distribution (subsidy to relatively affluent car buyers).
- The assemblers are generally opposed to significant standardisation of components and would need to be pressured into accepting this.
- To gain significant benefits through economies of scale in South Africa's small market, would require drastic rationalisation including assembly plant closures. This would result in limited choice and competition in the domestic market and pressure for imports.
- Standardisation and the skipping of models would lead to divergence from international model introductions and world levels of technology. This can make exports even more difficult as has been the case in Brazil.



### **3.3 Guided integration into the world market**

The objective of this strategy is to encourage specialisation and investment in world scale component manufacture and assembly. Success will depend in large measure on the costs of the adjustment process.

The strategy assumes a reduction in the number of local assemblers and in the number of models being locally produced. A few component firms would become international players with significant R&D capability supplying OEMs all over the world. Exports and imports would become much more significant.

An example of this strategy has been the Australian automotive plan (for further detail see Chapter One, section 2.3) which has received much attention in the South African policy debate and at the end of 1993 was the framework around which the new South African strategy was being developed by the MITG. It is generally regarded as having been successful in the Australian context by reducing the price of cars and making the industry more competitive and sustainable. At the same time, however, employment has fallen sharply and imports of vehicles have risen to nearly 50% of the total market. While the strategy has much merit, it requires considerable modification in the South African context. Australia is a mature economy with high rates of car ownership. Car production is unlikely to be a major growth area as the economy becomes increasingly service oriented. South Africa's position is very different. With a population that will be close to 50 million by the year 2000, low rates of car ownership and a potentially large regional market, it needs to position itself to become a significant producer in the first decade of the 21st century. This means that in the short term, less priority should be placed on bringing prices down to international levels if the cost is massive import penetration. Equally the scope for expanded production both for the domestic market and export means that it would be inappropriate to attempt to reduce the number of models and plants to the extent that has occurred in Australia.

The most successful developing country example of a guided integration strategy is probably Mexico, whose industry is already highly integrated into that of the US and will become more so under the North American Free Trade Agreement.

This strategy would require more developed linkages with the world market and, in particular, a greater commitment by MNCs and domestic firms to upgrade their investments. The difficulty would be to encourage investment especially in world scale assembly because of the lack of obviously apparent markets.

It would be necessary to gradually reduce protection for fully built up vehicles coupled with some form of foreign exchange balancing arrangement to encourage investment in local capacity.

### **Advantages of guided integration**

Integration into the world market and export expansion is important in order to:

- specialise production thus raising volumes and generating economies of scale. This would make more efficient use of scarce investment resources, for instance by allowing tooling costs to be amortised over a larger number of units of output.
- generate rapid learning and technological improvements.
- create pressure to upgrade quality and production efficiency in accordance with international best practice.
- at the macro level this strategy can reduce net imports in the auto industry.

If the above occur they can create a virtuous circle of expansion, productivity improvement and new investment.

### **Disadvantages of guided integration**

- The industry could become specialised in only a few minor components (a peripheral producer). There would be a need to retain domestic capacity with some form of forex balancing, limitations on CBU imports etc.
- There are many potential casualties to this approach such as component firms who cannot generate higher volumes through exports for various reasons (eg. licence restrictions, lack of access to overseas networks). Therefore, there is a need to maintain some protection for the local component sector in the short to medium term. It is also necessary for government to facilitate the process, for instance, by measures to reduce the model range which would lead to higher volumes in locally produced models.
- A rapid increase in imported CBUs may reduce the market for local assemblers to the extent that local assembly and component volumes don't really increase. This may require limiting the import of CBUs.
- The pace of expansion could be vulnerable to the decisions of foreign firms as to the extent to which they choose to integrate South African production into their global sourcing networks. Many South African firms could become 'saw tooth' suppliers which are used to supplement the output of the automated parent plant during periods of high demand. Thus the industry may fail to attract foreign or domestic investment. To some extent this is what has happened under Phase VI partly as a result of a generalised lack of investment. This points to the need for liberalisation measures to be cognisant of the prevailing investment environment as well as the importance of measures (such as support for R&D) to upgrade supply side capabilities.

Both guided integration and import substitution have advantages and disadvantages. Policy obviously needs to maximise the advantages and minimise disadvantages. The appropriate policy would be one which aims at guided integration into the world economy but includes a measure of selective import substitution through measures which encourage the commonisation of certain components.

## 4. Specific areas for policy reform

As we have indicated above, South Africa, in terms of its level of development, its existing capabilities and resources and the potential of its domestic and regional markets is *potentially* extremely well placed to emerge as a significant vehicle producer within the next decade. This will depend on the introduction of appropriate policies underpinned by a set of 'enabling mechanisms' to upgrade productivity and encourage new investment.

### 4.1 Creating appropriate incentives – the trade regime

- While trade policy is an important part of the overall growth model, it should be recognised that a fault with past policy has been an over reliance on the trade regime (in the form of indiscriminate protection followed by rapid liberalisation of imported components) as an instrument of policy. For any trade regime to be successful, it is necessary that it is complemented by policies designed to create an efficient industrial structure and upgrade supply side capabilities.
- Policy must set clear long term objectives and substantive changes to policy should be avoided once the policy is in place.
- If liberalisation is to be pursued, the objectives need to be clear. For example, if a priority objective is low prices in the domestic market, the approach to liberalisation will be different to an approach which is concerned with the longer term development of the industry. In South Africa, the latter is the prime objective with affordability a means to this end. Thus the objectives of (gradual) liberalisation should be to:
  - put pressure on industry to upgrade
  - reduce input costs both into assembly and into components production so that exports can compete
  - encourage specialisation to attain higher volumes and economies of scale
- Liberalisation should be premised on equal pain for assemblers and component producers. Under Phase VI the success of exports has meant that component producers have borne the brunt of liberalisation. Effective rates of protection on CBUs have increased encouraging further proliferation and increased variety in component requirements.

- Trade policy should focus on providing some ongoing protection for the domestic market (but at a gradually reducing rate).
- Structural changes and encouragement of exports must happen before the domestic market is liberalised as far as is possible.
- In any programme of trade liberalisation, cognisance needs to be taken of factors impinging on investor confidence. In a climate of political uncertainty and resulting lack of investment as currently prevails in South Africa, the supply response to new opportunities opened up by liberalisation is going to be very limited. Great caution must be exercised in reducing trade barriers. Phase VI was particularly badly timed in this respect.
- However a phasing down of tariffs on CBUs should begin immediately with a reduction to a rate of 60% over five years a reasonable target. Small volumes of CBU imports should be allowed but may need to be limited to say 10% of the domestic market with special additional allowances for assemblers exporting in high volume.

## **4.2 Establishing an efficient structure – rationalisation of the industry**

As has been discussed in the main body of this report, the structure of the industry in terms of the proliferation of models and makes in the small domestic market raises costs in assembly and especially in component production. This is a direct result of heavy protection on CBUs and the failure to limit the entry of assemblers into the market.

But policy needs to take account of existing capabilities. For instance a programme which aims at developing rationalised world class component suppliers such as have emerged in Australia, may be inappropriate for South Africa given that many local component suppliers have developed low volume capabilities as a competitive strength and this is potentially skill – as well as labour-intensive.

The problem of proliferation should be dealt with by a combination of the following four strategies:

### **A reduction of models and makes being produced in South Africa to be achieved by:**

- a prohibition on new assembly plants being established by new companies coming into the market. The exception would be if the intention was to establish a world class plant which would need to be exporting on a large scale. New manufacturers entering the market would therefore be required to export over half their production within say three years
- a prohibition on new makes being introduced into the market by existing assemblers unless the above condition is met.

- reduced protection for CBUs subject to the limits on the number of imports (eg. not to exceed 10% of the market initially).
- the introduction of a system of penalties and incentives to encourage volume production and a reduction in the number of models being assembled domestically. One possibility would be to make part of the excise duty currently payable under Phase VI dependent on the number of models produced. The objective would be to reduce the number of models being assembled domestically by at least a third over 5 years.

However, the rationalisation process outlined above should be pursued more gradually than was the case in Australia and would have somewhat different objectives for the following reasons:

- the need to take account of market growth (it may be possible to some extent for the overly fragmented industry to 'grow into' an expanding market thereby realising larger volumes and limiting major closures).
- the need to avoid the prospect of market niches vacated by local producers being taken up by large scale imports as has happened in Australia.
- the obvious socio-economic and political difficulties of forcing plant closures. Assembly plant closures may occur but should not be a requirement as was the case in Australia.

This course of action would result in a reduced choice of domestically produced vehicles in the domestic market and also in less competition, although to some extent this would be countered by a small increase in imports. If limited competition led to excessive collusion and overpricing it may nevertheless be necessary to impose ceilings on car prices through limiting the premium which may be charged over international prices. This would be justified on the basis that new entrants are being restricted in an effort to generate higher volumes.

## **Standardisation**

Ways need to be sought to encourage standardisation of components. This could involve major or minor components and would be one way in which to encourage local production of major components such as gearboxes. The problem is that standardisation is generally opposed by the assemblers. It would, therefore, require government action in the form of incentives/penalties.

## **Specialisation and the expansion of exports**

One obvious route to higher volumes is through expanding exports. This could take various forms and can be encouraged by some form of foreign exchange balancing

requirement. Phase VI has already signalled a shift in this direction in the sense that it has encouraged component exports which in turn has allowed assemblers to reduce local content in certain models. The main problem has been that the way it was structured has led to an increase rather than a reduction in the number of makes and models being locally assembled.

### **Greater flexibility in South African firms**

Rationalisation as outlined above will go some way to reducing the negative impact on production costs resulting from proliferation but is only a partial solution because average volumes will remain fairly small. South African firms need to make a virtue out of what most currently perceive to be a problem and improve efficiencies and flexibility in low volume, high variety production. There is substantial domestic and international evidence to indicate that large gains can be made in this direction. Many have already developed significant capability in low volume niche market type production and as new methods of work organisation are introduced, there is great scope for productivity improvement without massively raising volumes.

## **4.3 Enhancing capabilities**

Any programme of restructuring which is based in part on greater integration into the world market carries risks as well as opportunities. It is absolutely essential for the success of such programmes, that there is a positive supply response by the industry as a whole. For example, if a programme of import liberalisation aimed at reducing input costs does not lead to greater exports, it is bound to fail. It is important that firms are able to upgrade themselves to enter export markets. There is, therefore, an important role for 'enabling policies' which encourage this upgrading process. These are important in five areas:

### **Technology**

There are a number of weaknesses in the technological capacity of the industry and the mechanisms by which it is transferred from foreign firms.

- Overall spending on R&D is low especially when compared to the East Asian new entrants such as Taiwan.
- There is an excessive dependence on foreign licensors. This is both costly in terms of royalties paid and restrictive especially of exports.
- Links to governmental and other research institutions such as the CSIR are poorly developed in most cases.

These all require action in the form of:

- incentives for R&D spending.
- closer supervision of licensing agreements and perhaps state involvement to secure more favourable terms which should preferably include a training commitment by the licensor.
- a closer integration of governmental and other research institutions with industry through directing funding towards applied commercial applications.

## **Training**

The current lack of trained person-power in the industry is a weakness but is not an overriding constraint. Problems include:

- poor levels of school education leading to low levels of literacy and numeracy
- a poorly structured system of overall industrial training. It is excessively rigid in terms of demarcating artisanal categories and does not give full accreditation to people with existing skills.

These problems need to be addressed across the educational and training system as a whole.

- In the automotive industry, there are probably sufficient training facilities within companies and the public sector except in specialised areas such as robotics.
- The availability of qualified trainers is also not a binding constraint.
- Initiatives in the sphere of training need to be centred around improved access to training and creating broad areas of industrial competence rather than narrowly defined areas of skill.

## **Work organisation**

Most studies of shifts in competitiveness in the international auto industry cite work organisation as the cutting edge of competitive advantage. Thus 'lean production' defined broadly to include not only production but also linkages to suppliers as well as the distribution system is widely seen to be the major reason for the competitive success of Japanese auto firms. While South African management are generally fully aware of the potential of lean production, attempts to implement it have frequently been on a piecemeal basis and lacked support of the workforce.

Implementation of these initiatives needs to take account of problems which are especially acute on the shop floor of the average South African auto plant and which are primary obstacles to a fuller mobilisation of the experience and capabilities of production workers in achieving productivity improvements. These are the hierarchical employment structure of South African firms with large pay differentials between management and production workers and between different skill grades which are accentuated by racial divisions and continuing discriminatory practices. Japanese style innovations which do not address these issues are likely to be partially successful at best.

NUMSA has been pro-active in introducing work organisation, training and grading as central issues for collective bargaining. A framework which links work organisation to issues of training, grading and wage levels provides a sounder basis for implementing lean production than the piecemeal introduction of Japanese style innovations.

The IMVP is currently engaged in a comprehensive study which will compare South African with foreign producers in terms of lean manufacturing benchmarks. This will indicate very clearly the weaknesses (as well as strengths) of the local industry and generate greater awareness of the importance of improving this area of production. A case in point is the galvanising impact that the international assembly plant survey conducted in the course of the International Motor Vehicle Programme has had on the American and European industries.

## **Investment**

There is little basis for special tax concessions or other incentives for the motor industry and it is unlikely that an upsurge of investment in this sector could take place in isolation from a more broadbased increase in investment. However, given the advantages that would accrue from a world scale plant producing vehicles or major components, there may be a role for direct state involvement in negotiating directly with a foreign company to undertake such an investment preferably in partnership with a local firm or even with the state as a shareholder (for example, through the IDC). The point is that an investment on this scale would have a number of positive external benefits. It would have a significant demonstration effect on the rest of the industry, it could encourage the more widespread adoption of Japanese style work organisation and also attract investments by suppliers of components and subcomponents. The impact that Japanese investment in assembly plants in the UK has had on upgrading both the domestic assembly and component producer industries is a case in point.

## **The institutional structure**

The institutional structure supporting the industry needs to be improved. It currently has a number of weaknesses.



- The data available on the industry is extremely limited and of poor quality
- The ability to monitor the impact of policy or to predict its effect is limited. An example is the unintended consequences of the Phase VI programme. A model of the industry needs to be developed to make more accurate assessments of the impact of policy measures.
- Governmental support for productivity improvement is very limited or non-existent in areas such as research and development, the implementation of new forms of work organisation and training.
- The assembly and component industries and their respective federations are primarily concerned with promoting policies favourable to their particular industry. This frequently takes the form of attacks on each other or lobbying government. While this is understandable, there needs to be far greater cooperation between the two major sectors of the industry and a greater emphasis at the industry level on ways to upgrade productivity, encourage research and development etc.
- At the regional level there may also be scope for improved cooperation between component suppliers and assemblers.

## Appendix One: Wage data index

**Hourly compensation costs for production workers: index U.S. =100.  
Motor vehicles and equipment manufacturing (US SIC 371).  
1975 and 1981-1991**

	1975	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
United States	100	100	100	100	100	100	100	100	100	100	100	100
Canada	76	68	68	69	69	66	67	71	79	83	86	86
Brazil	14	15	14	10	8	8	—	—	—	—	—	—
Australia(1)	60	56	55	52	53	43	44	48	55	57	58	—
Japan (1)	37	45	40	43	42	41	59	68	79	73	70	75
Korea(1)	5	8	8	9	9	9	9	10	15	22	26	26
Taiwan	—	12	10	9	11	9	11	14	17	19	21	22
Belgium	75	72	57	55	51	50	68	83	84	78	92	—
Denmark	61	51	46	43	39	38	53	69	70	64	75	—
France	53	53	49	48	43	42	55	63	65	61	71	65
Germany	83	78	72	72	63	61	84	105	111	104	121	115
Ireland	39	39	37	35	31	32	42	53	59	53	63	—
Italy	54	45	42	43	40	40	52	64	66	67	77	75
Netherlands	70	56	52	49	43	42	55	67	69	64	73	—
Portugal	—	16	15	14	12	11	15	18	19	—	—	—
Spain (1)	—	—	—	—	—	—	—	—	—	—	—	—
Sweden	78	70	57	50	51	51	63	76	82	83	94	91
United Kingdom	42	46	42	39	35	35	42	50	56	55	63	62
South Africa (2)	—	16	15	16	13	9	10	13	15	15	17	17

(1) Industry notes: Australia, transportation equipment. Japan, including motorcycle manufacturing. Spain, transportation equipment.

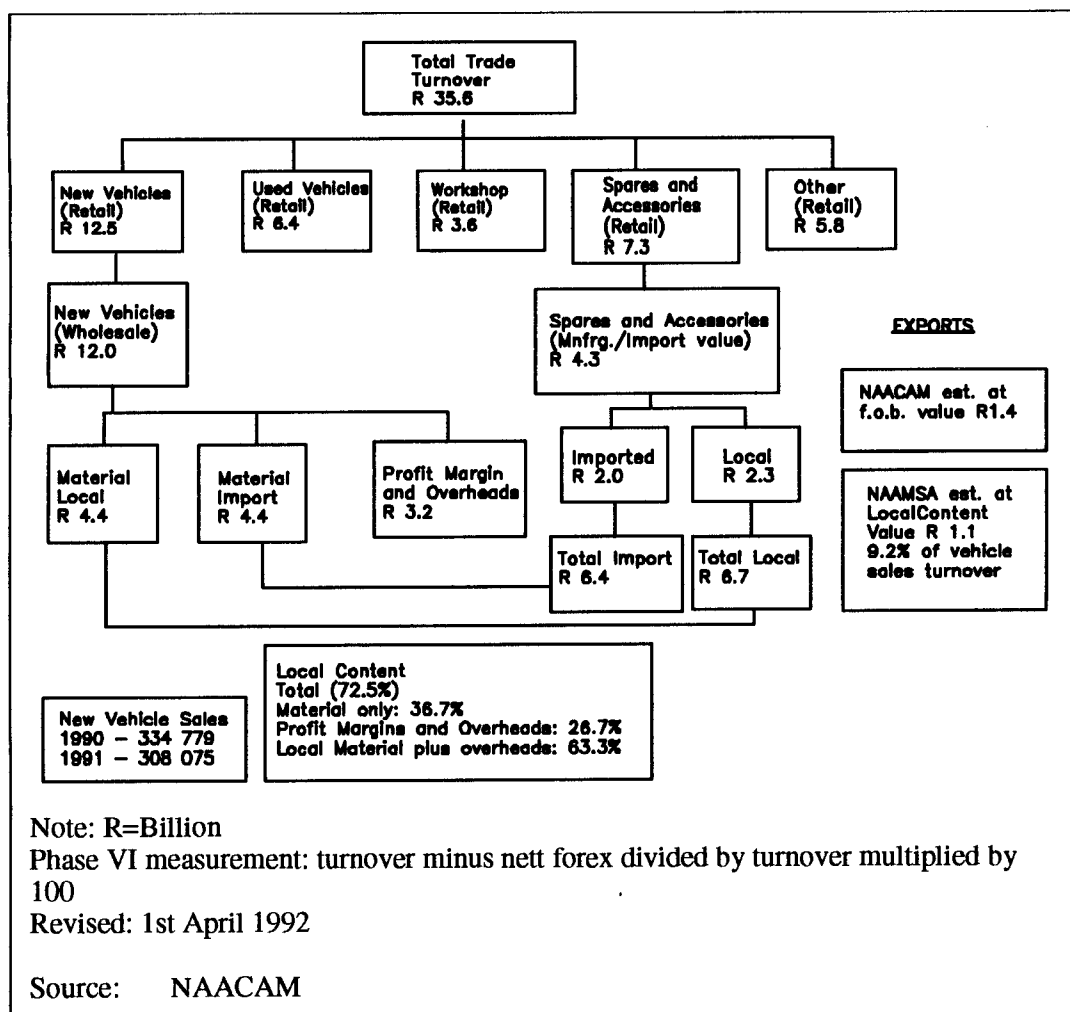
(2) South African data supplied by NAAMSA.

Source: U.S. Bureau of Labour Statistics, April, 1992, NAAMSA.

**Hourly compensation costs for production workers in U.S dollars.  
Motor vehicles and equipment manufacturing (US SIC 371)  
1975 and 1981–1991**

(1) Industry notes: Australia, transportation equipment. Japan, including motorcycle manufacturing. Spain, transportation equipment

## Appendix Three: Motor industry - total trade turnover



## Appendix Four: Transport policy and environmental considerations

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This report has been concerned with vehicle production and industrial policy rather than with the issue of transport policy. It has also said very little about environmental issues which have become a central concern in the international automotive industry. As a response to the environmental impact of vehicle use, new product technology is leading to:

- lighter more fuel efficient vehicles.
- reduced emissions and zero emission vehicles (battery powered).
- increased recyclability of materials used in vehicle production.

As is the case in other areas of automotive technology, South Africa is some years behind in introducing such products. It is, however, very important to distinguish between policies which impact on the production of vehicles and policies which impact on domestic demand for vehicles. This report has suggested a range of possibilities for expanding production in an industry which is seen to have very considerable growth prospects. Automotive production is a relatively clean industry in terms of waste and energy intensity. According to the Environmental Monitoring Group (1993), the automobile sector is, with the exception of electronics, the cleanest in terms of waste output and energy consumption per unit value of output of the industrial sectors for which data are given.<sup>1</sup> Subsectors such as the foundries are more problematic but they need to be seen in perspective. Automotive foundries in Europe and Japan are under increasing pressure for environmental reasons and South Africa could benefit as an exporter of automotive castings. At first glance this may sound like importing dirty industries. Actually, it would be the opposite as by further processing the products of the (energy and waste intensive) metallurgical sector which are currently exported in raw form, it would actually reduce the energy and waste intensity of overall manufacturing output.

The more serious environmental issues facing South Africa are in the area of vehicle usage and the impact in terms of emissions, traffic congestion, road accidents etc. This points to the overriding environmental issue being the need for a coherent long term transport policy to develop efficient forms of public transportation even as private vehicle ownership becomes increasingly affordable. While vehicle ownership will grow rapidly as incomes rise, we have argued in this report against artificial measures<sup>2</sup> to stimulate demand which would, of course, be to the short term advantage of the industry but would impact negatively not only on the environment but on the macro economy (rising imports) as well as constituting a subsidy to a relatively affluent section of the population.

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1. These sectors are chemicals, metallurgical, fabricated metals, automobile, electronics, pulp and paper, textiles, food processing and building materials.
  2. Most typically tax benefits, but such measures could also include artificially low fuel prices and over-investment in roads/under-investment in public transport.

## **Appendix Five: List of companies and organisations interviewed**

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### **Assembler firms**

BMW (South Africa)  
Nissan (South Africa)  
Volkswagen (South Africa)  
Volkswagen AG  
Sanyang Industry Co. (Taiwan)

### **Component firms**

ACS Corporation  
Alfred Teves  
Asseng Automotive  
Atlantis Diesel Engines  
Autoplastic  
Bosal  
Dorbyl Automotive Products  
Gabriel (SA)  
Girlock (SA)  
Metair Investments  
Midas Export  
Murray and Roberts Foundries  
National Spring  
NF Die Casting  
Robert Bosch  
Silverton Engineering  
Steelmobil  
Tiger Wheels

### **Industry federations**

National Association of Automotive Component and Allied Manufacturers (NAACAM)  
National Association of Automobile Manufacturers of South Africa (NAAMSA)  
The Society of Motor Manufacturers and Traders Limited (UK)  
Verband der Automobilindustrie (Germany)

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## **Consultants**

Associated Information Technologists  
Econometrix  
Faull and van der Riet

## **Trade unions**

National Union of Metalworkers of South Africa  
IG Metall (Germany)

## **Research institutions**

Centre for Automotive Industry Research, Cardiff Business School  
CSIR  
Institute of Development Studies, University of Sussex  
Institute for New Technologies (INTECH), Netherlands  
Industrial Technology and Research Institute (ITRI), Taiwan  
Investment Research Department, Old Mutual  
Labour Research Service, Cape Town  
MERIT, Netherlands  
School of Management, University of Bath  
Science Policy Research Unit, University of Sussex

## **Government agencies**

Board on Tariffs and Trade  
Department of Trade and Industry  
Industrial Development Corporation

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The study will be of interest to those concerned with industrial strategy and the future of South Africa's automotive industry.

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